GINEERING FRA PROPOSES TRACK-STANDARD CHANGES

October 9, 1972

RAILWAY AGE

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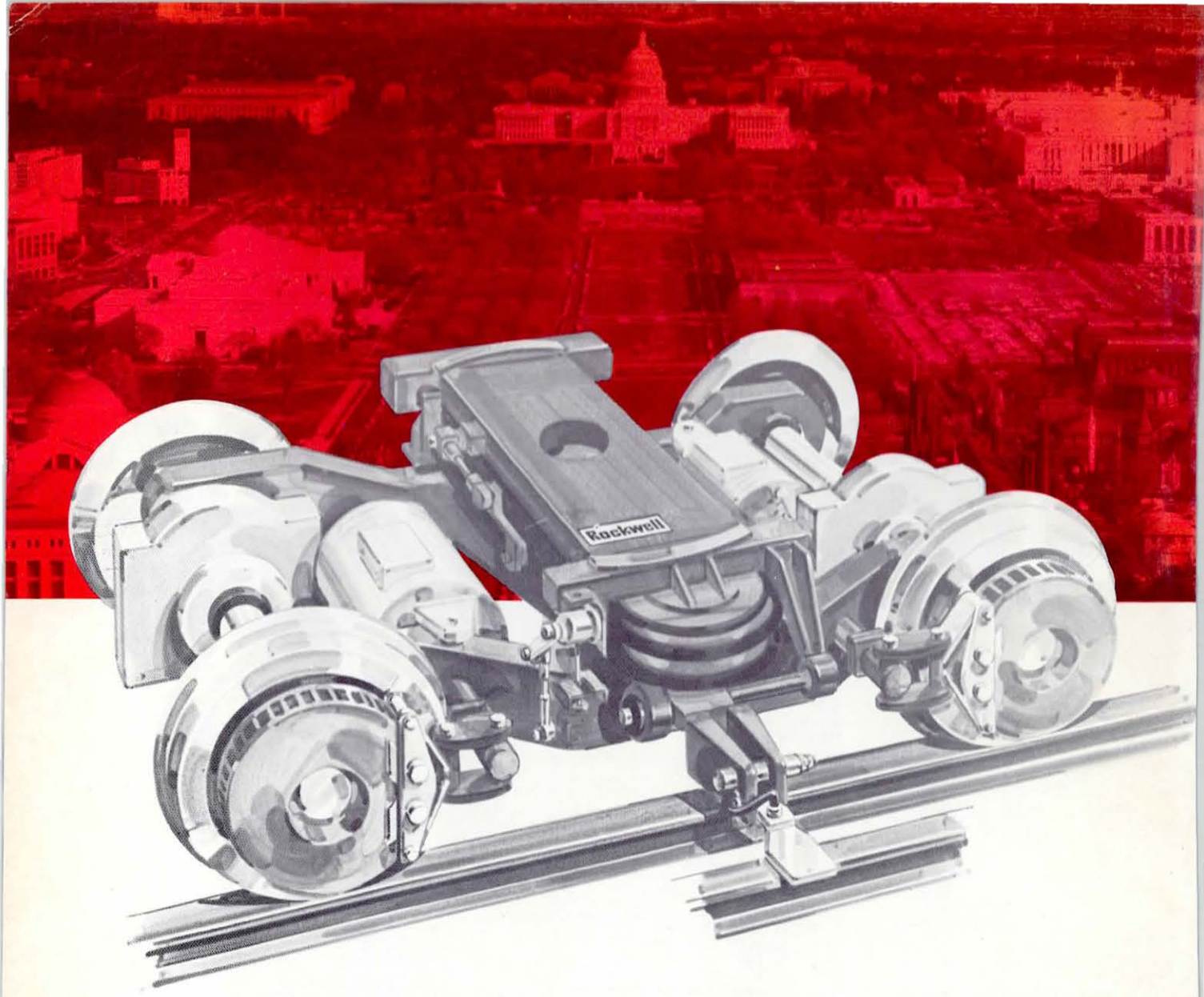
Product of GE's systems approach



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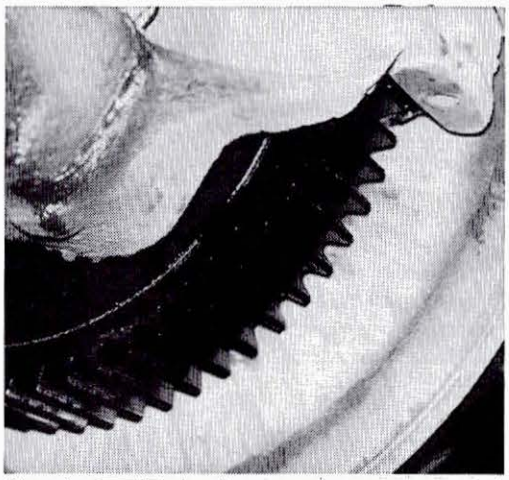
Rockwell

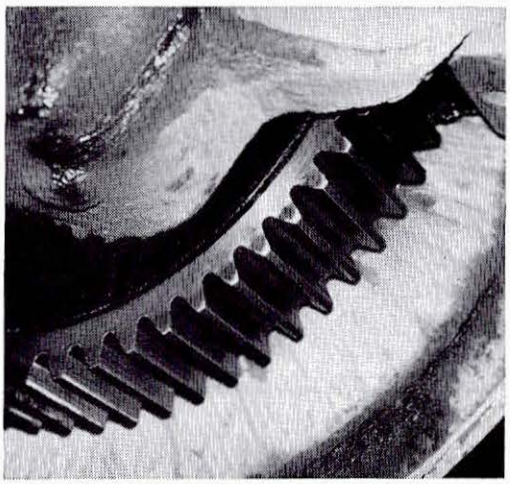
TRANSPORTATION DIVISION
Atchison, Kansas 66002

Circle 1 on coupon page 33

New Mobil Dorcia® 107 Traction Gear Lubricant- 18,000,000 miles without lubrication failure.



Gear immediately after gearcase was opened.



Gear after cleaning—
no pitting, scoring or feathering.

These pictures show the condition of a "green" gear in a locomotive taken after the crucial break-in period.

The locomotive is just one of 235 high-performance units—1600 to 3600 hp—belonging to a major midwestern railroad that one year ago switched to Dorcia 107 Traction Gear Lubricant. Since this time these units have operated over 18,000,000 miles, without lubrication failure.

The top picture shows the gear of one unit immediately after it was opened. The lower one shows the gear after it was cleaned. Notice there's no trace of pitting, scoring or feathering after traveling over 129,000 miles.

One reason for such outstanding performance is Dorcia 107's excellent mobility—adhering to the upper teeth and draining from the lower teeth. This permits complete coverage of all contact areas and prevents channeling, even in extremely low temperatures.

In addition, Dorcia 107 doesn't adhere to the gearcase sides so there's less opportunity for leakage.

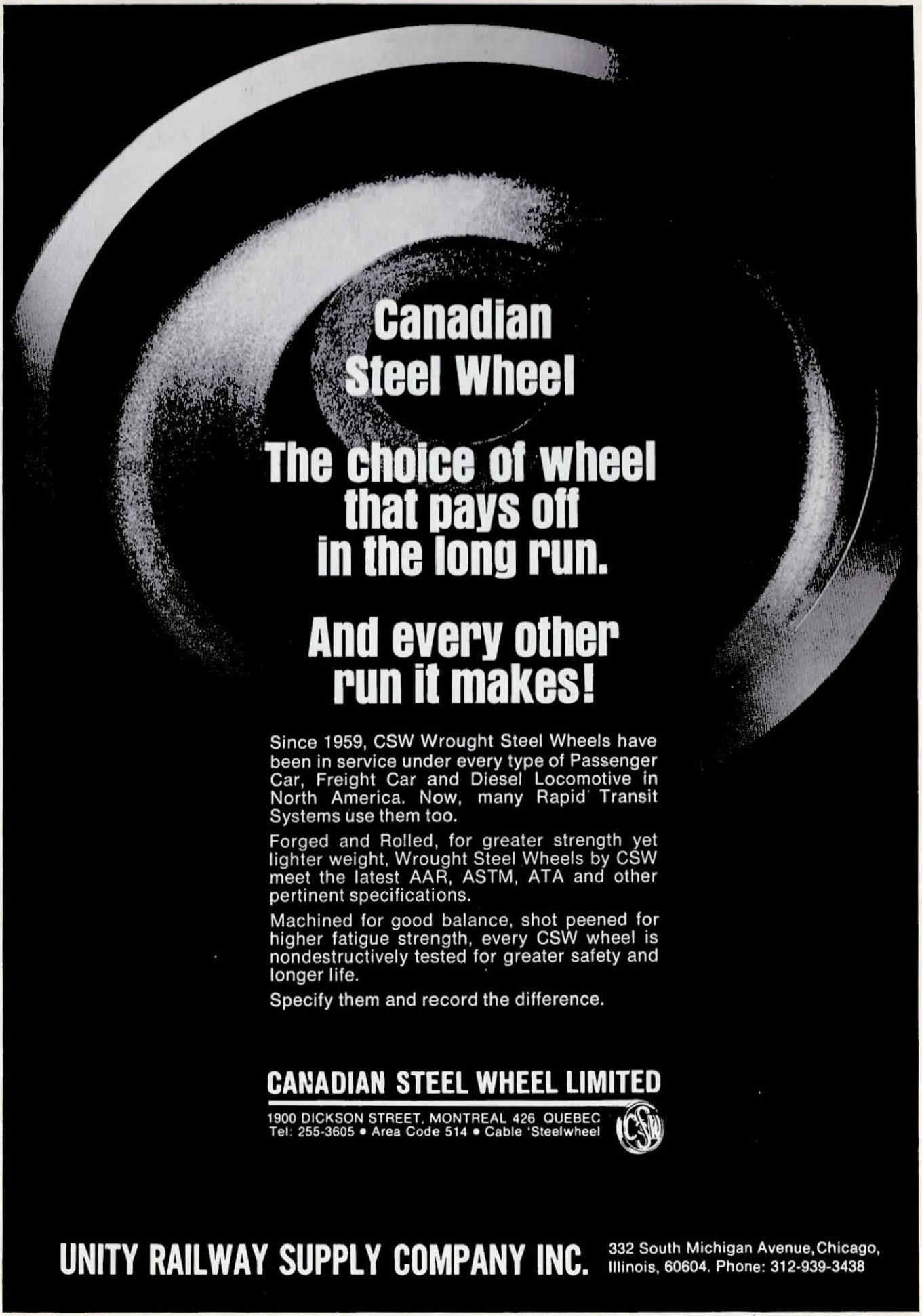
In laboratory tests measuring load-carrying ability and anti-wear characteristics, Dorcia 107 proved superior to conventional gear lubricants. In the presence of water, Dorcia still had good adhesion without softening while regular lubes lost adhesion, thinned out or foamed to the top of the gearcase.

Get in touch with your Mobil representative about Dorcia 107 soon. You'll be glad you did. Mobil Oil Corporation, 59 East Van Buren St., Chicago, Ill. 60605.

Mobil®

We sell more by selling less.

Circle 3 on coupon page 33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Circle 4 on coupon page 33

RAILWAY AGE

October 9, 1972 • Vol. 173 No.7

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Inside

LUTHER MILLER

THE PASSENGER-CAR BOOM

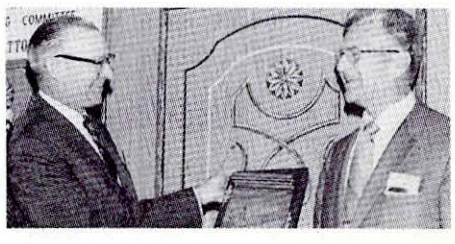
Just a few years ago, orders for new railroad passenger cars were reduced to such a thin trickle that the American Railway Car Institute even stopped counting them. But the bust picture of a decade ago is very definitely a boom picture today. Pullman-Standard a few weeks ago pocketed a $210.5-million contract from New York's MTA for 752 cars—the biggest single such order in history, and it could get even bigger: as many as 900 cars may be produced under this contract if all options are exercised. Earlier, the Rohr Corp. won Washington Metro's $91.6-million contract for 300 cars. And just a few days ago, Rohr, which is already building 250 cars for BART, won an order for an additional 200 BART cars to cost around $72 million.

While the big money right now is in transit, there is evidence that a new market may be building: Amtrak President Roger Lewis says he will soon be shopping for intercity cars.

Meanwhile, between the urban and the intercity markets there is another: for commuter cars. It is this market that is presently keeping the nation's newest carbuilder, General Electric, busy. At its new facility at Erie, Pa., GE is now building 144 ac/dc M/U cars for New York and Connecticut, to be used on Penn Central's New Haven division. When that is completed, work will begin on 144 electric M/U's for the Southeastern Pennsylvania Transportation Authority, and 70 identical cars for the New Jersey Department of Transportation. Mechanical Editor Fred Houser recently traveled to Erie for an on-the-scene look. His report starts on p. 25.

ENGINEERING GROUPS HONOR BOB DOVE

"Who's Who in Railroading" confirms that Associate Editor-Engineering Bob Dove is the "old man" of the Railway Age editorial staff. But with Bob, you tend to throw away the calendar—because years notwithstanding, nobody around here brings more enthusiasm to his job or works harder at it. And that's also true of his participation in the activities of industry organizations. All RA editors are activists when it comes to industry-participation, for whatever they may be able to contribute. But Bob Dove has been doing it longer than most—and, quite possibly, better. Maybe that's why the Roadmasters and Maintenance of Way Association of America gave a plaque to Bob at the group's annual meeting last month in Chicago. It honors him for 28 years of "dedicated and meritorious service," and it was presented by W.J. Jones, engineer-maintenance of way and structures, system, of Southern Pacific on behalf of the organization.



Do someone a favor!

Who? *Someone you'd like to see get ahead!*
How? By his signing up for a one year study course to update his shop craft skills. Courses available include:

1-Year Skill Improvement Program for CARMEN: safety, car details, inspection, interchange rules;

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Many other training programs are available and can be tailored to meet particular needs. Coupon will bring information.

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☐ Please enroll me in the _____ course. Here is my check for $6.00. I will pay $6.00 per month until the course has been completed ($72.00 total). I understand I may cancel at any time.

☐ Please send me more information on the _____ course.
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RAILWAY AGE

OCTOBER 9, 1972

NEWS

WASHINGTON	Briggs to succeed Schultz at AAR	p. 8
	FRA issues a Flexi-Van ban	p. 8
	House action on STA now seems unlikely	p. 15
MOVING PEOPLE	Riders still flock to BART despite mishap	p. 10
	Harris poll projects big future for Amtrak	p. 39
	Avco-GE sign $10-million car body order	p. 24
	Deal for French Turbos reported near	p. 24
	BART to acquire 200 more Rohr cars	p. 24
	Ronan is transit's "man of the year"	p. 24
PENN CENTRAL	Trustees want a 15,000-mile system	p. 19
MOVING FREIGHT	New intermodal service is set up	p. 18
TECHNOLOGY	DT&I nears 100% aci coverage	p. 8
	DF-equipment-repair network is begun	p. 8
ECOLOGY	Pollution fight is waged by Electro-Motive	p. 18
FORECASTING	RPI schedules a "look ahead" panel	p. 8

FEATURES

ENGINEERING	Revised FRA track standards ease crosstie requirements	p. 20
MOVING PEOPLE	GE "systems approach" produces New Haven Cosmopolitans	p. 25
CONVENTIONS	3,000 attend technical sessions and view exhibits in Chicago	p. 30
	OSHA is no threat, M/W men are told	p. 35
	Track/train dynamics featured at Coordinated meetings	p. 36
	Signaling and Data groups stress role of computers	p. 37

OPINION

INSIDE	The passenger-car boom	p. 5
LINES ON LABOR	1973: What about it?	p. 19
VIEWPOINT	BN's Menk prescribes for business health	p. 42
WATCHING WASHINGTON	Branch-line subsidies?	p. 15

COVER

Multiple production tracks extend through the 300,000-square-foot, $14-million car-building facility at Erie, Pa., where a General Electric photographer found every assembly station full.

DEPARTMENTS

Advertising Sales Offices	p. 41	Moving People	p. 24
Carloadings	p. 38	New Products	p. 33
Freight Traffic Trends	p. 38	Piggyback Loadings	p. 38
Market Outlook	p. 38	Short and Significant	p. 8

Short and Significant

BRIGGS TO SUCCEED SCHULTZ AT AAR

Richard A. Briggs, executive director of ASTRO since September 1970, has been named to succeed James A. Schultz, AAR vice president for public relations and advertising. Briggs, 33, is a summa cum laude graduate of Princeton University. Prior to joining ASTRO he was personal assistant to three consecutive ICC chairmen. ASTRO (America's Sound Transportation Review Organization), whose 1970 report on the industry's future led to this year's proposed Surface Transportation Act, will wind up its life at the end of this session of Congress. Its functions after Jan. 1 will be performed by the AAR public relations department and a new policy section now being formed under former FRA Administrator A. Scheffer Lang, special consultant to AAR President Stephen Ailes.

PC AUGUST LOSS HALF THAT OF 1971

Penn Central on Sept. 28 reported a net loss of $10.4 million for August, 55.5% below the $23.2 million deficit recorded in August 1971. Losses for the first eight months of this year were $145.9 million, down 18.6% from the $179.2 million loss in the like 1971 period. Extraordinary losses from tropical storm Agnes, however, raised the net loss for 1972 thus far to $165 million. PC also reported freight revenues of $137.9 million for August, up $12.1 million from August a year ago.

DT&I NEARS 100% ACI COVERAGE

Detroit, Toledo & Ironton has moved closer to becoming the world's first railroad to have 100% of its operating fleet and principal yards equipped with automatic car identification systems. Agreement has been reached to install nine Servo Corp. KarTrak aci systems to provide complete coverage of DT&I lines in Michigan and Ohio. The new systems will supplement those installed in 1970 in Michigan.

DF-EQUIPMENT-REPAIR NETWORK BEGUN

Six regional service centers to repair and maintain railcar damage-free lading-protection equipment have been established by Evans Products' industrial division. They are in Plymouth and Gagetown, Mich.; Chicago; Cordova, Md.; Columbus, Ohio, and Denver. "Our plans are to increase our present service network on a national basis within two years," says Arthur P. Gruner, general manager of the new service. "This network will service our own DF equipment as well as that produced by other manufacturers."

FRA ISSUES A FLEXI-VAN BAN

All Flexi-Van cars of Mark III and IV classes (570 cars) were ordered out of service, effective Sept. 27, by the Federal Railroad Administration. The order followed inspections which revealed high incidences of center-sill cracking. Cars of these two classes could not be restored to service until it was determined through inspections that their center sills were crack-free. It was also ordered that Mark III and IV cars would have to be inspected at each terminal where loaded or unloaded, but no less frequently than 48 hours. FRA has requested that each railroad owning or leasing Flexi-Vans in the Mark I, II and V classes inspect them and notify FRA of any center-sill defects. Penn Central operates the largest share of the 1,557-car Flexi-Van fleet.

RPI SCHEDULES "LOOK AHEAD" PANEL

Four chief executives will be quizzed on railroad prospects during the 64th annual meeting of the Railway Progress Institute in Chicago Oct. 12. Illinois Central Gulf President Alan S. Boyd, Frisco President Richard C. Grayson, Penn Central Trustee Jervis Langdon Jr., and Burlington Northern Chairman Louis W. Menk will face a panel composed of four reporters. RPI Chairman Donald Y. Clem, president of McConway & Torley, will moderate the discussion. At the conclusion of the meeting, railroad men from throughout the country will be hosted by railroad suppliers at the RPI's annual dinner.

FRA TO SPONSOR ABANDONMENT SYMPOSIUM

FRA Administrator John W. Ingram said his agency would sponsor a National Symposium on Low Density Rail Operation in the near future to find a "rational system for producing criteria for unemotional decisions regarding abandonment." Addressing the annual meeting of AAR's Cost Analysis Association in San Francisco on Sept. 21, Ingram declared, "Increased abandonments may well produce restrictive legislation unless well-conceived guidelines have been developed."

MACHINE-TOOL ORDERS CONTINUE UPWARD

Orders for U.S. machine tools totaled $108.3 million in August, according to the National Machine Tool Builders' Association. That was the fourth straight month the order figure topped $100 million. Machine-tool orders, a key indicator of the state of the economy, reached some $807.9 million during the first eight months of 1972.

Good thing, too.

Because we rent more GM cars than anyone else in the world.

As a matter of fact, on any given day we can put upwards of fifty thousand people on the road.

And that fact, we must confess, staggers us a bit.

Why, it seems like just yesterday we were just a small car rental company. And here we are bucking heads with the big boys in New York, Boston, Chicago, San Francisco, L.A. And just about every other city you can name.

Not to mention all those cities you probably can't name.

Today, there are actually some 2,400 National counters where we can put you behind the wheel of a '72 Chevy (or some other fine car).

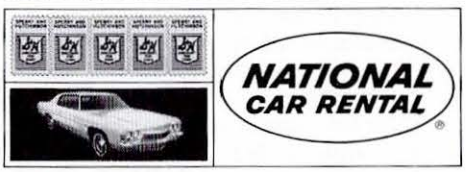
But as grown up as we've become, we haven't outgrown our quaint way of thanking you for your business. We thank you with good old S&H Green Stamps.*

Another perhaps quaint attitude we haven't outgrown. We think reservations are sacred.

When you call to tell us when and where you want a car, that's it. We don't intend to let anyone else rent the car we promise to save for you.

We're determined to treat you like you were still our only customer in the world.

To reserve a car in the U.S. and elsewhere in the world call 800-328-4567 toll free.†



Take advantage of us.

National Car Rental System (in Canada it's Tilden Rent-A-Car). *Valid on U.S. rentals only except where prohibited by law. †In Minnesota call 612-944-1234 collect. © National Car Rental System, Inc. 1972

Riders still flock to BART despite mishap

Bay Area Rapid Transit's first few days of revenue operation were, in a word, golden. "Day One" for 28 miles of the 75-mile BART system—Oakland to Fremont—was Sept. 11, and a series of "mini-ceremonies" at 12 sparkling stations went off without a hitch. During the first five days of operation, 100,000 paying customers slipped magnetized tickets into the automatic gates, and marveled at the nearly noiseless approach of trains into the stations; and enjoyed "the smoothest ride this side of the pearly gates," as one of them put it, in luxurious carpeted cars. BART began service with eight trains—six two-cars in length and two with three cars—traveling the initial 56-mile loop at eight-minute intervals during peak commuter hours and every 15 minutes during the remainder of the 6 a.m.-to 8 p.m. operating day, Monday through Friday.

Said General Manager Bill Stokes: "We expected this enthusiastic response to tail off but it didn't. The pattern remained the same: honest-to-goodness commuters crowding aboard in the morning, lunch bags and newspapers in hand, and then the mid-morning to late afternoon onslaught of excursion riders out to test what they had been waiting for for the past 10 years, followed by the commuters' nightly return. Our train-operation was near-flawless, with the occasional glitch or bad-order train quickly erased or replaced. The silence of the cars and the smoothness of acceleration and deceleration impressed all who traveled aboard BART from Day One on through the first two weeks."

In a speech prepared for the annual meeting of the American Transit Association in Seattle Sept. 24, Stokes started out by saying: "You will have to excuse my ill-concealed glee today, and the general state of euphoria that I have found myself in since Monday, Sept. 11."

Actually Stokes never delivered the speech, and the reason he didn't was calculated to add to his euphoria; President Nixon, in California for fund-raising affairs, decided to take a ride on BART. On Tuesday night, Sept. 26, BART had completed plans for reception of the President and the first lady, and went through a dress rehearsal that lasted until midnight. The next morning BART closed down to all except the Presidential party for two hours (A.C. Transit buses were hired at cost to take care of regular passengers).

PRESIDENT AND MRS. NIXON with General Manager Bill Stokes after a ride on BART.

Stokes greeted President and Mrs. Nixon at the San Leandro station. "It's beautiful, just beautiful," said Mrs. Nixon as she spotted the train. The President and Mrs. Nixon rode with Stokes to the Lake Merritt Station beneath BART's modernistic headquarters, and there he spoke to a gathering of BART employees. The President, said Stokes, was agreeably impressed with the ride and expressed confidence in the future of rail transit generally.

All the time, television cameras were whirring and that night millions of viewers across the land got the picture of the nation's No. 1 citizen riding the world's newest rail transit system.

Altogther, it was a great day for BART—and, as Dr. William J. Ronan, chairman of New York's Metropolitan Transit Authority remarked later in a congratulatory telephone call to Stokes, for the cause of rail transit generally.

Just a few days later, however, another picture of BART was being flashed on television screens. It was a picture of a BART car that had plunged through a sand-box barrier at the Fremont terminal and into a parking lot. What caused the accident? Late last week two investigative teams were trying to find out—a three-man team named by the National Transportation Safety Board; and BART's own special board, headed by David G. Hammond, assistant general manager for operations and engineering, and including two outside experts. Four passengers were shaken up but released from hospital after examination. The train attendant, Eli Palmer, 36, suffered concussion and bruises.

The car that went through the barrier was No. 143, which had been okayed for service just the night before and had completed two round trips.

There were some die-hard BART haters around the country who were quick to seize the chance to say "I told you so." But Bay Area residents who use BART seemed to take the mishap with calm. The system was out of service for only half an hour after the accident—and when the trains came back, so did the riders. On the morning after the accident, one BART-watcher reported: "I saw half a dozen trains pass during the commuter hours—all with standing loads."

Circle 12 on coupon on page 33 ▶

Vapor Slim-Line door operator "fits in" with GE's "reliability concept" for New Haven cars...

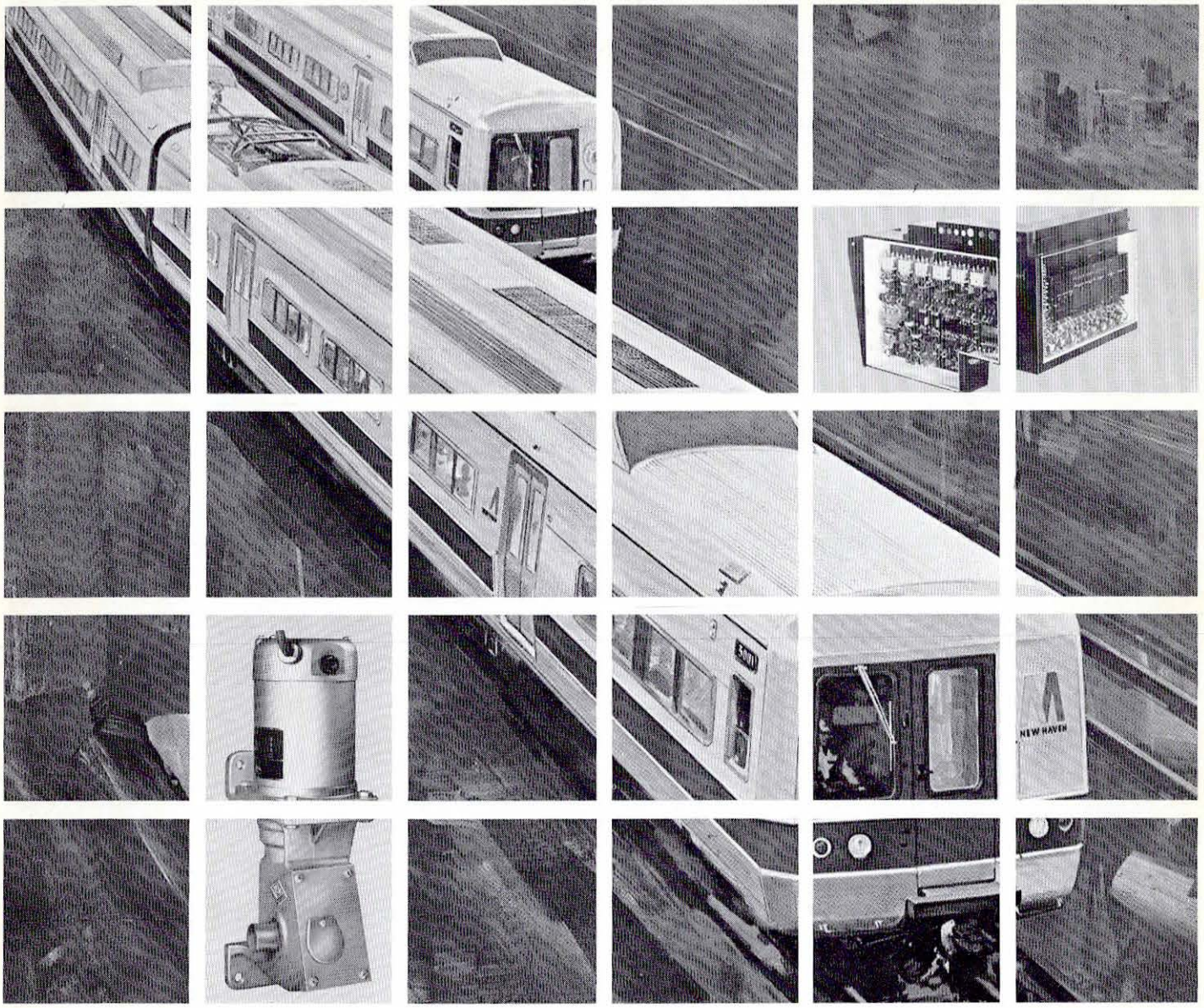


Photo courtesy General Electric Co., Transportation Systems Division

The new Slim-Line design originated and developed by Vapor engineers is just another of the many new product ideas that "fits in" with the General Electric Company's high standards of maximum reliability set for the one hundred forty-four New Haven cars.

The new design of Vapor's Slim-Line door operator permits "fitting it in" between the outer sheathing and interior walls of the car. This puts Slim-Line up off the floor where it is always clean and convenient to inspect. Increased reliability results.

And Slim-Line's new lightweight, completely unitized package is a benefit to car builders—makes easier handling, reduces installation time.

Then too, Slim-Line "fits in" with the new technology allowing the car designer greater freedom in body styling and seating arrangement.

Other new rail system passenger cars where life-cycled lab tested, performance-proved, in actual service Vapor electric Slim-Line door operators "fit in"—LIRR-788, BART-250, NYCTA-500, Staten Island-52, PATH-46, Turbo-Train-4, Hudson Harlem-172, ELW-155 and of course, the New Haven-144. This totals 2,101 car sets.

And that's what we're talking about when we say Slim-Line "fits in."

The Slim-Line door control system is just one of the innovative, "advance concept" product ideas Vapor has developed in conjunction with transit authorities, consulting engineers and car builders.

Vapor Corporation has total capability to provide complete door operating and signal control systems as well as speed indicating air comfort control and heating equipment for your transit, railroad commuter cars and people mover vehicles with immediate response to your needs.

Vapor Corporation has the flexibility to design, develop and manufacture electronic, electro-mechanical and pneumatic products to meet the high standard of reliability and performance demanded by today's transportation systems.

And Vapor Corporation products are backed up by our nation-wide, dependable, where and when you need them, technical service group.

For information contact the Transportation Systems Division, Vapor Corporation, 6420 West Howard Street, Chicago, Illinois 60648. In Canada, Vapor Canada Limited.

VAPOR CORPORATION

MORE THAN 50 YEARS IN THE TRANSPORTATION FIELD

At L&N, when they go in for Samson brake shoes they come out with longer shoe life and reduced wheel wear.

Samson now standard for L&N Road Locomotives.

First the Samson brake shoe proved itself in rugged service on cars of the L&N's Florence Coal Train operating through the coal fields in Western Kentucky. Locomotive engineers reported better handling... both in terms of shorter stops, and a 12-pound brake pipe reduction as opposed to 20-pounds with standard metal shoes.

All Samson shoes were painted yellow, then weighed and steel-stamped with serial numbers to insure test accuracy. Weight loss, wheel tread wear, and individual car mileage were all tabulated in terms of the Samson versus regular iron shoes. And the Samson gave 1.9 longer shoe life... plus reduced wheel wear.

Then the Samson was tested on L&N road locomotives, and again the shoe gave longer life than regular iron. By switching to Samson on all metal-shoe locomotives, L&N mechanical executives calculated they could save at least $16,000 per year in costs of material and labor. In addition to important bonuses of better braking performance and spark suppression. So they standardized.

If you would like additional facts about the Louisville & Nashville tests, or how the Samson shoe earned AAR conditional approval for interchange, contact your Abex representative. He's a good man to have working on your railroad.

(Left to right in photo) C. A. Love, Chief Mechanical Officer, Equipment; G. H. Kendall, Chief Mechanical Officer, Motive Power; C. N. Wiggins, Assistant Vice President, Mechanical. These 3 key mechanical executives of the L&N, always on the lookout for a better way, standardized on the Samson shoe.

Abex
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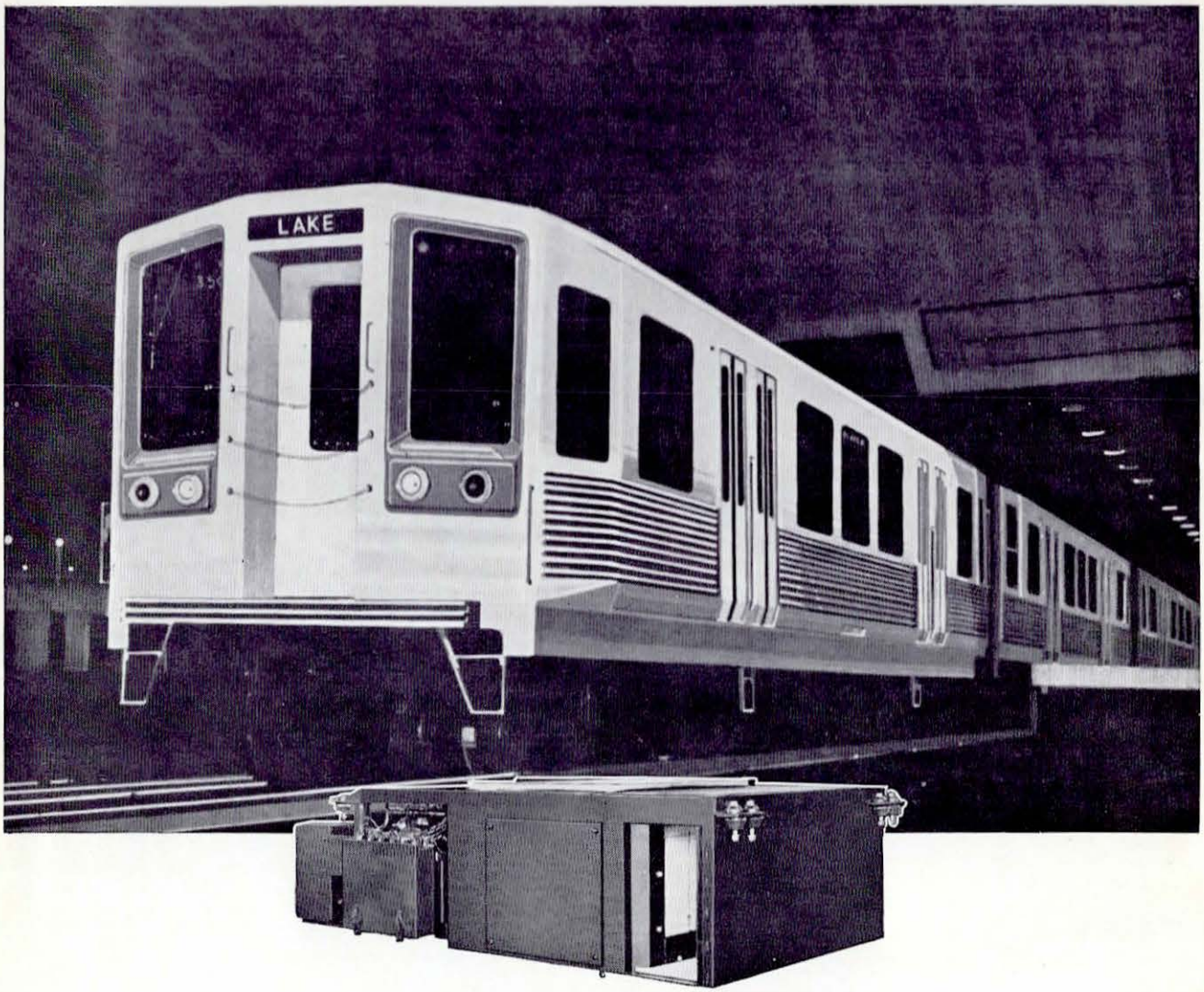
"Safety" air conditioning: the system of the 70's



The "Safety" 10-ton air-conditioning unit on these 150 CTA-Budd cars is a self-contained package system designed for undercar application. It consists of combined condenser-compressor and evaporator-blower sections mounted on a common support frame, insuring adequate and dependable air conditioning under all weather conditions.

"Safety" has a complete line of component and package-type air conditioners designed for special types of cars and conditions. We will be pleased to send you information on equipment to meet your needs.

SAFETY ELECTRICAL EQUIPMENT CORP.

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◀ Circle 6 on coupon page 33

Circle 7 on coupon page 33

House action on STA now seems unlikely

The proposed Surface Transportation Act of 1972, which rails and their modal allies have strongly pushed all year, seemed dead last week—but was it?

Chief of the obituary writers was none other than Chairman Harley O. Staggers (D.-W.Va.) of the House Interstate and Foreign Commerce Committee.

"I don't see how we can do anything on it—it's a big piece of legislation and it goes into an entirely new aspect of transportation," said Staggers, whose key committee must approve the bill if it is to come to House vote. With Congress recessing at midmonth to fight the election, it seemed doubtful there would be any House action on the bill, even if, as seems likely, Congress returns to work in a lameduck session after Nov. 7.

Staggers' words seemed to dash rail hopes for the bill's passage this year. It could be resurrected in the next session of Congress, and no doubt will be, but then the whole laborious process of public hearings must be repeated and any action will come too late to relieve rails before 1974 at least.

Ironically, Staggers' eulogies were being pronounced just as STA seemed to be coasting to new highs in public support:

—AAR sources said rail labor had agreed to work with rails to push STA, and a union official was quoted as saying the agreement constituted a "whole new day" in rail labor relations. There was some hope the union backing could sway Chairman Staggers to report out the bill (Staggers is strongly pro-labor). But privately, an AAR staff member mourned, "If only we had the support of the United Mine Workers"—a reference to that union's strong West Virginia influence on Chairman Staggers.

—DOT Under Secretary of Transportation James M. Beggs on Sept. 20 said DOT would go all out to support the House version of STA. Echoing earlier words of DOT Secretary John Volpe, Beggs declared, "We do not intend to desert the industry in its hour of need." But it seemed that the Administration, in shelving finally its controversial deregulatory proposals, had arrived too late on the scene. "If DOT had supported the bill six months ago, it might be law now," criticized a rail officer.

So many pre-mortems have been offered on STA, that it seemed indecent yet to announce it duly interred. There is still the remote chance the bill might receive floor consideration, especially if Administration, rail, and labor backing can prod the dilatory Mr. Staggers.

Watching Washington

REID BEDDOW

BRANCH-LINE SUBSIDIES?

Rails' legislative program for next year is not receiving much attention these days, pending Congressional action on the Surface Transportation Act, the Presidential election, and rumored changes at DOT. Thoughtful persons here, however, are devoting some attention to what Congress can do next year if Federal Judge John Fullam suddenly serves notice to Congress that a successful Penn Central reorganization demands new and swift forms of government aid. (Among the thoughtful persons: Former FRA Administrator A. Scheffer Lang who for some time has been serving as special consultant to AAR President Stephen Ailes on a broad range of policy questions.)

With nationalization the lowest on everyone's list of options for a PC rescue, much attention is focused on the feasibility of a program of Federal, state, and local subsidies to PC, shippers, or public bodies for continued operation of some deficit lines outside PC's trimmed-down "core" system.

A cautious beginning to these subsidies has already quietly surfaced in the Senate. In its version of the proposed Surface Transportation Act, the Senate Commerce Committee authorized $50 million to assist states and localities in subsidizing unprofitable branch lines rails want to abandon. The Federal government would meet 70% of the operating deficits of such lines; states, shippers, or local bodies—or a combination thereof—would provide 30%. Another subsidy is in the Senate's bill to aid storm-damaged rails: it provides $10 million to assist localities in acquiring outright branch lines which then presumably would be operated by rails under contract.

HOW THE BRITISH DO IT

The Senate Commerce Committee in June received a confidential memorandum from British Rail on BR's "Cooper Formula" which estimates the costs and earnings of deficit service and thus the amount of government money needed to cover the shortfall. Government grants are awarded, said the BR memorandum, "to secure the social and economic needs of the country and. . .stability and self confidence within the industry itself by removing the financial obligations which have little relevance to economic reality."

Until the Senate activity, the only public discussion of subsidies has been by PC trustees: Trustee Jervis Langdon, Jr., addressing the third annual Delaware Valley Regional Transportation Conference, in September flatly asserted, "If the public wants a continuance of. . .deficit services, it should be willing to pay for them."

TWO DEFEATS FOR TRANSIT ON CAPITOL HILL

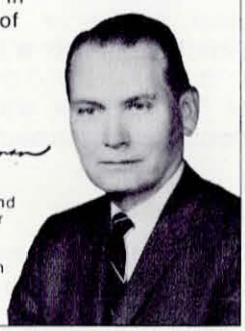
The House Rules Committee, dealing with two separate bills, has killed two proposals dear to the hearts of transit lobbyists: one would have provided $400 million a year for transit operating subsidies; the other would have permitted states to divert $800 million a year from their $5 billion of Highway Trust funds to urban transit facilities.

General Electric progress in

GE invests $31 million in ground transportation facilities

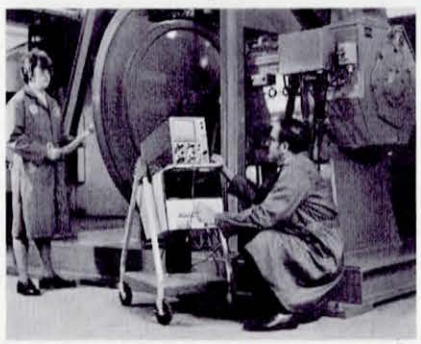
The General Electric Company's major commitment to the future of ground transportation has resulted in more than a $31 million investment in new facilities since early 1971. This investment has enabled GE's Transportation Systems Business Division to improve its customer service capabilities and its ability to contribute to the balanced transportation concept, nationwide.

A new Rapid Transit and Commuter Car Assembly Facility . . . an automated Transportation Renewal Parts Distribution Center . . . and GE's new Transportation Technology Center bear witness to this major commitment in the future of transportation progress and in the progress of our country.



B. W. Wyman
Vice President and
General Manager
Transportation
Systems
Business Division

General Electric builds new 50,000 sq. ft. Transportation Technology Center



One of the advance programs at GE's Transportation Technology Center is evaluation of linear induction motors. The motors will someday power people movers and high speed ground vehicles.

GE's new Transportation Technology Center, a modern, ground transportation technology laboratory, is now in operation. The 50,000 sq. ft. Center is located at GE Transportation Systems Business Div. headquarters in Erie, Pa.

The Center's research and development teams are undertaking programs which encompass major areas of ground transportation technology. GE scientists will share in the development of concepts for the future . . . concepts characterized by increasing speeds, automatic control, greater reliability, improved safety and reduction of noise and air pollution.

In the area of advanced technology studies, programs include: □ development of linear induction motors for high-speed inter-city travel and for low-speed people mover applications □ new vehicle suspensions to improve locomotive and transit and commuter car ride quality □ solid state power conditioning and power collection for application to transit and railroad electrification □ advanced propulsion equipment aimed at developing higher horsepower motors.

Additionally, the Center is equipped to perform day-to-day problem solving research in disciplines including: □ analytical chemistry □ metallurgy □ insulation and non-metals — electro-mechanical analysis and measurements.

Longer range studies are being conducted by the Center to assist transportation system operators in identifying and solving operational problems. Cost-benefit comparisons of new and existing products, as well as performance simulations which investigate product operation under realistic operating conditions, are offering GE improved research and methodology for design optimization.

New Distribution Center speeds 24,000 parts to customers

GE's new Transportation Renewal Parts Distribution Center in Erie, Pennsylvania became operational in late 1971 to form a vital link in GE's nationwide parts distribution service.

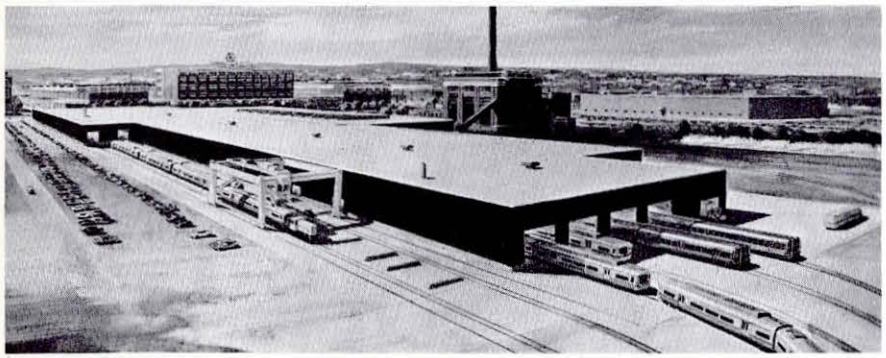
Today, the new 150,000 sq. ft. Distribution Center is equipped with an automatic ordering system and new pre-pack stacker crane which facilitate GE shipment of any of 24,000 in-stock transportation parts anywhere in the United States in 24 hours.

Atlanta, Erie, Los Angeles, Minneapolis and St. Louis Regional Parts Centers are strategically located to provide General Electric transportation customers fast and convenient parts support.

transportation systems

General Electric transportation systems

$14 million Rapid Transit and Commuter Car Facility most advanced in industry



The new GE Rapid Transit and Commuter Car Assembly Facility is the most modern and advanced in the industry.

The New Haven commuter cars have the distinction of being the first cars to roll out of General Electric's new $14 million Rapid Transit and Commuter Car Assembly Facility at Erie, Pa.

Dedicated to "Man on the Move," the 350,000 square foot building is the most advanced in the industry. The latest techniques have been applied including numerically-controlled machinery, an automated parts storage and retrieval system and a whole new approach to car assembly — all adding quality to the completed car and helping assure on-time delivery. GE is the nation's first prime contractor to also manufacture the propulsion and control systems.

Included in the complex are areas for subsystems testing, automated systems evaluation and environmental testing.

The new facility, along with integrated systems management and extensive testing procedures, is designed to establish new standards of reliability, comfort and performance for rapid transit and commuter cars.

Locomotive testing facility investment leads to higher quality

Comprehensive test cycle utilizes closed-circuit television and computers.

Increased customer demands for locomotive quality have been met by new investments in GE's locomotive testing facility.

Direct reading of digital meters, addition of automatic recording systems and incorporation of a new communications system all serve to enhance locomotive quality. Additionally, a new tape-controlled electrical testing system, designed specifically for locomotives, contributes to substantial test time savings.

Other improvements in the facility include: ☐ sound-proofed control room ☐ structural changes to isolate fumes and noise ☐ consolidation of testing into a 4-track area and relocation of gas, oil and other service facilities for greater accessibility.

120-02

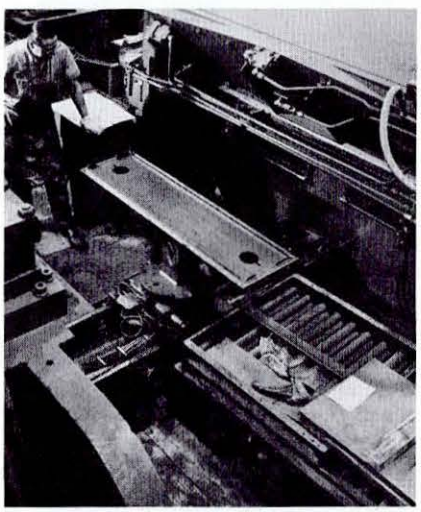
New automated manufacturing processes increase locomotive quality/reliability

While General Electric continues to incorporate new advances into its locomotive offerings, it is upgrading and expanding manufacturing facilities and equipment as well.

A new numerically-controlled punching and nibbling machine, the first of its kind in the United States, now cuts large irregular shapes from sheet steel.

A numerically-controlled plate-bending machine bends heavy steel plate into 30-inch-wide circular barrels which later become motor and generator frames.

Other manufacturing advances include the use of 12-torch oxygen cutting machines, a semi-automatic door-making machine and computerized procedures to support the production cycle.



Manufacturing advances include semi-automatic door making.

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GENERAL ELECTRIC

Circle 8 on coupon page 33

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Circle 5 on coupon page 33

New intermodal service is set up

A new transportation service providing the first nationwide system for intermodal movements of bulk commodities will begin this fall. The new, privately owned service—X-Rails Systems, Inc.—is expected to help shippers reduce their investment in storage facilities, cut packaging and handling costs and improve rail car utilization. H. J. Quis is president of XRS; George K. Hausser is vice president for marketing.

High-capacity terminal operations are planned in Chicago, East St. Louis, Cleveland, Cincinnati and Pittsburgh on Norfolk & Western properties. Expansion into all major U.S. distribution centers is planned. Already in advanced planning stages are a terminal in the New York City marketing area and another on the NW in Detroit.

A major marketing innovation of the XRS program will be a graduated scale of incentive pricing based on total annual volumes. "We feel," Quis says, "the ability to offer one central contact point, one quotation source, one quality control center, together with an incentive pricing plan, will be of great interest to the shipping community." In addition to usual transfer services, XRS will offer truck cleaning, product sampling, heating and track storage, he added. "Our operations are completely flexible and can be tailored to the individual needs of any user. For those who desire packaging of products, either custom or standard pack, we plan to provide each terminal with the necessary equipment to meet the demands."

The new service has been under study for months, during which NW has worked closely with Quis through its vice president for pricing and marketing, John McMichael. McMichael says the NW is enthusiastic about the location of the initial operations on its line; he predicts a bright future for XRS and the railway. "From our point of view," he adds, "increased equipment utilization and a more efficient level of service for rail shippers make this intermodal concept a valuable addition to the total transportation service offered by NW. A wide range of products can be handled."

The NW officer said shippers can extend their markets under the XRS program by virtue of lower distribution costs; receivers will benefit from the immediate availability of product at local sources. Costs will be reduced, he said, because of lower rail rates on bulk materials.

Pollution fight is waged by EMD

The railroads' conversion from steam to diesel-electric motive power may have been industry's greatest single achievement in improving the environment—but that doesn't mean the locomotive builders are ignoring opportunities for further improvement, and Electro-Motive Division has just issued a progress report on what has been happening at LaGrange.

EMD's program is two-phase—one concerned with design and test of engine components and the other aimed at measurement and analysis of emissions and development of new measurement and sampling techniques.

On the component side, improvements involve a widening of cylinder lining ports, higher positioning of top rings on pistons, tests of the even-higher "fire ring" piston top-ring location, and the mid-1972 development of a low-smoke fuel injector with a low-emissions spray tip.

In its measurement/analysis program, EMD has run tests both at its plant at 625 feet above sea level and at locations about 8,000 feet above sea level on two western railroads. Results of these tests on the non-turbocharged or Roots-blown engine, EMD says, show the "dramatic improvement in smoke performance of this engine which has been made possible by the new components, particularly at altitude. However, even the improved non-turbocharged engine will not meet our rigid smoke criteria at altitudes above 3,000 feet if operated at rated power. To meet the desired minimum smoke level, a special feature can be installed on the engine which automatically reduces fuel input as lower barometric pressures—higher altitudes—are encountered." Similar results have been obtained in testing of EMD's turbocharged 645 engine, and as the builder points out "The turbocharged engine is much less sensitive to altitude conditions and it is not necessary to reduce fuel input in order to meet our rigid smoke criteria at up to 8,000 feet."

Based on results thus far, EMD says, "we foresee that the achievement of large reductions in oxides of nitrogen will be difficult, especially in that directionally, reductions in oxides of nitrogen are generally in conflict with reductions in smoke, carbon monoxide and hydrocarbon emissions." As for sulphur dioxide, this "must and will be controlled by limitations on the permissible sulphur content in fuel oil. While fuel oil prices can be expected to reflect the added cost of reduced sulphur content, lower sulphur fuel should reduce engine wear."

PC trustees want 15,000-mile system

Penn Central trustees are currently basing their reorganization planning on a 15,000-mile system rather than the 11,000-mile "core" system previously studied.

In an Oct. 1 report to the Federal court overseeing PC's bankruptcy proceedings, the trustees said the proposed 15,000-mile system—5,000 route miles less than the present network—could produce some $243 million in income available for fixed charges in 1976. The smaller system proposed earlier would produce only $133 million, "not enough to support reorganization largely because of the vastly increased cost of labor protection for the smaller system."

As of Sept. 15, the trustees had been authorized by the court to apply for abandonment of 3,670.5 miles and application has been made to the ICC to abandon 2,410.8 miles. But to date, the ICC has approved abandonment of only 685.5 miles. At the present state of abandonment, the trustees warned, the proposed 15,000-mile system cannot be achieved by 1976. They said that if necessary they will propose that the court order the required level of abandonment as a part of the final plan of reorganization.

As promised in their July 1 report to the court, the trustees listed several alternatives to an income-based reorganization, emphasizing that "this is not a position of pessimism but one of prudence so that the court, the public and all interested parties may begin to consider the alternatives, in case that the requirements for a private-income based reorganization cannot be met."

They noted that these alternatives "are by no means limited to complete government ownership and operation—nationalization, or cessation of service—liquidation." But a fundamental alternative, they said, would involve public assistance to support operating costs or to supply capital needs. Such assistance, they suggested, could include several forms of operating subsidy; and meeting capital needs through such devices as government purchase of right-of-way, help in supplying freight cars, and government loans or guarantees to retire existing debt and claims at less than face value.

As alternatives not requiring public funds, the report suggested release from inequities in local taxation; segregation of non-rail assets from the railroad to help satisfy claims against the company; restructuring all of the eastern railroads; and sale of some or all PC lines.

The report was the trustees' second to the court on reorganization progress.

Lines on Labor

GUS WELTY

1973: WHAT ABOUT IT?

This is the time of year when Railway Age editors try to find the heartbeat and measure the pulse-rate of the "baby" that will be born at midnight Dec. 31—and, as usual, that finding/measuring job sure isn't easy. Look at just one aspect of 1973—railroad management/labor relations. What will the new demands be, after Jan. 1? What will the economy do, and what will management and labor make of the economy's showing? Have relations between top people in management and labor and among the negotiators actually improved? And if they have, what—if anything—will that mean when the bargaining begins? Is labor's new support of railroad legislative goals significant? Can management, union leadership and the rank-and-file really unite on joint programs for industry betterment?

MANAGEMENT/LABOR CONFLICT?

Over the past year, from what you hear from both sides, railroads and rail labor organizations have opened much better lines of communication. At the top level and at the negotiating level, people are talking more. Obviously, messages are getting through, and labor's support for rail-backed legislation is just one evidence of that. What's most important in the long run may be the fact that 1972 has seen a distinct drop in the acrimony-factor. Maybe it's because 1972 has not been a big negotiating year, but for whatever reason it is a fact that there have been very few headlines screaming the news that management and labor are fighting.

BUT BARGAINING TIME WILL COME—AND THEN WHAT?

The crunch will come, though, when the brotherhoods put their contract proposals on the line and when the railroads make known their new ideas for making improvements in productivity. And is there anything that looks encouraging in this potential confrontation? Indeed there is: Particularly in negotiations with the operating organizations, there has been evidence—on both sides—of a new willingness to give in order to get. Through much of the 1960s, there was no such evidence. And, while employees were making wage/benefit gains during those years, management had little to show for its efforts. Economic strength had a lot to do with this, and the unions had the strength. But a valid point could also be made that in the '60s nobody ever bothered to try to talk, to listen, to compromise, to do the things—even though they might be unpopular—that give some hope of providing long-range and not just short-range betterment.

Administration and Congressional action will have to be watched, of course, no matter how the November elections come out. Government could come on stronger, or it could fall back weakly, or it could continue in a standby role (at least where work-stoppages are concerned). If the polls are right, both Administration and Congress could be taking a somewhat tougher line next year. But that remains to be seen, and—really—it will be management and labor, not government, that will determine what happens.

And what are the odds? At this point, the odds are that management and the unions have their best chance in years to settle things themselves—with gains for both.

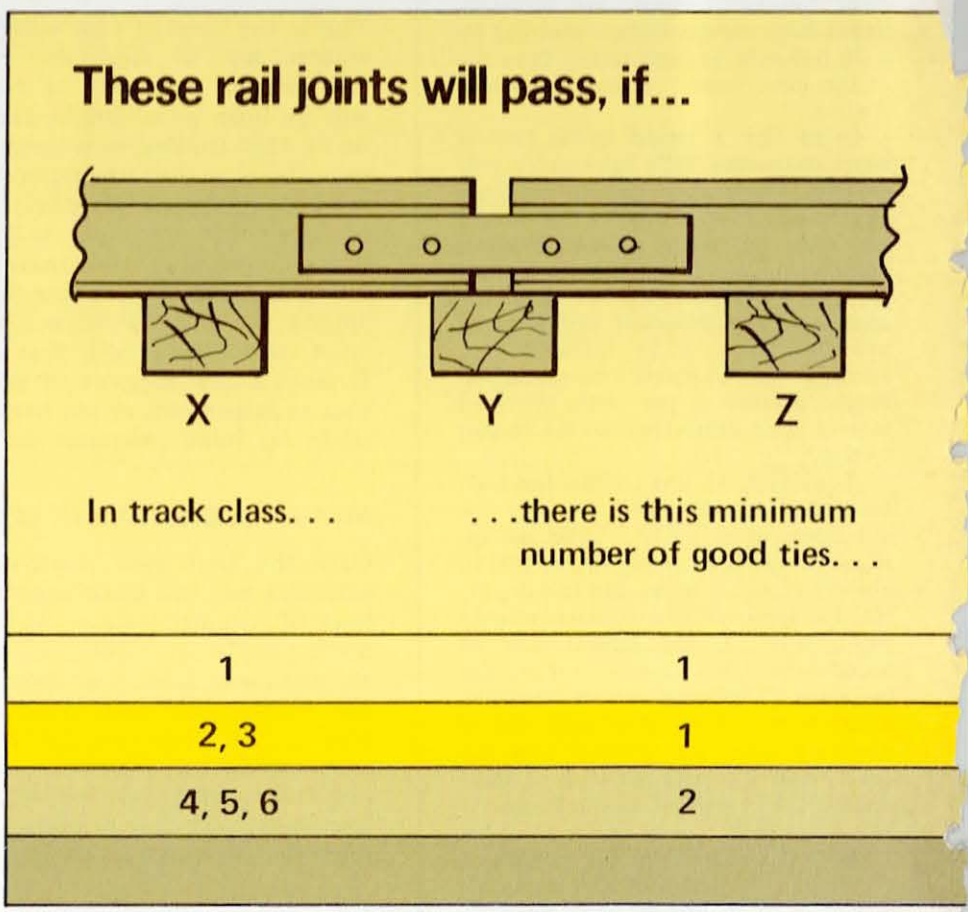
Revised FRA track standards ease

By MERWIN H. DICK
Engineering Editor

The uncertainty that has surrounded the FRA Track Safety Standards since they were published on October 20 last year has been lifted—but not entirely.

As reported earlier (RA, Sept. 11), recommended modifications of the standards were published in the Federal Register of Sept. 8. This was the first step in the Federal rule-making procedure. The purpose was to invite interested persons to submit written views or comments. A public hearing was scheduled to be held at Washington Oct. 6 so that interested parties could make oral statements or present further written comment.

In a preamble to the modifications, the FRA explains that most of them apply to those portions of the standards which were scheduled to become effective Oct. 16, 1972. The FRA said it anticipated completing the rule-making proceeding to allow for those proposals that are adopted also to become effective on that date. Two of the proposals deal with the requirements for cross-ties and markings for curved track, which will not be effective until Oct. 16, 1973. "Final action on these two amendments, could be postponed if necessary," said the preamble, "to enable a final rule on the others before Oct. 16, 1972."



● **Questions remain.** Thus, the original effective dates of the standards are left intact. The board of directors of the AAR, at its meeting Sept. 29, voted not to apply for an extension of the effective date of the standards. Thus, such action will be left to individual roads that may feel they need more time to bring their tracks up to standard.

The railroads were frankly dissatisfied with many of the original provisions of the standards. In its preamble the FRA said merely that it "had been in contact with members of the railroad industry to discuss problems which may arise in complying with the new safety standards." For the most part, it added, "the amendments proposed. . .stem from these discussions with industry and from the FRA's own considerations."

In some instances, it is stated, the proposed amendments are intended to correct deficiencies in the present rules which make enforcement difficult: "In others, the amendments would modify certain restrictions that are not justified by operational safety."

● **Higher passenger train speeds.** One of the more significant proposals concerns allowable speeds of passenger trains, which is being made on the basis of a petition filed by Amtrak. The amendment would establish higher speed limits for passenger trains operating over Classes 1 through 5 track. There would be no increase in the present maximum speed of 110 mph over Class 6 track.

Under the existing rule there is no distinction between speed limits for passenger trains and freight trains over any class of track. It was explained in the preamble that these speed limits will result in an unnecessary reduction in present minimum running times for some intercity passenger trains. For example, over the Penn Central route between New York and Washington, 24 minutes would be added to the minimum running time of the Metroliners. Between New Haven and Boston over Penn Central track No. 1, the minimum running time would be increased 34 minutes. And over the Union Pacific line from Denver to Ogden, one hour and 17 minutes would be added to the minimum running time.

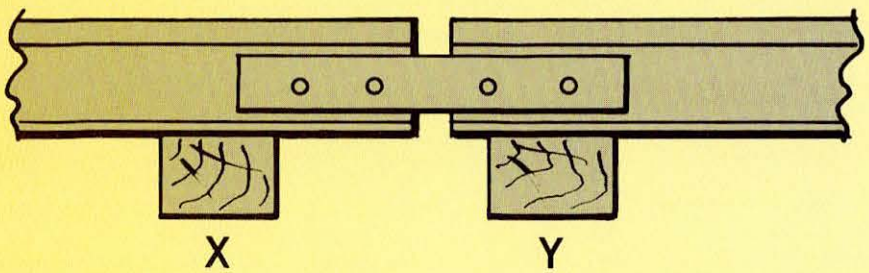
Increased speeds for passenger trains are justified by a number of factors, it was explained. First, contrasted with freight-car trucks, trucks for passenger cars are designed with (1) greater vertical spring deflection, giving lower natural frequencies of vibration; (2) greater distance between axles, adding stability when rounding curves; (3) greater minimum permissible tread thickness on wheels, reducing the likelihood of wheel rim fracture; and (4) provisions to minimize car roll on springs. Secondly, passenger cars are almost all equipped with the type "H" tightlock coupler which reduces jack-knifing forces.

"In short," said the preamble, "the FRA believes that passenger trains can move faster than freight trains over Classes 1 through 5 track, with no loss in safety."

Compared with permissible freight-train speeds, the increased speeds permitted by the recommended provisions are 5 mph for Classes 1 and 2 track, 20 mph for Classes 3 and 4 track, and 10 mph for Class 5 track.

● **Crosstie provisions changed.** Among the provisions of the original rules that were greeted with pained outcries from railroad men were those which had to do with crossties. The effect of these provisions may be softened somewhat

crosstie requirements



. . .in these required positions (supported joint)	(suspended joint)
X, Y or Z	X or Y
Y	X or Y
X and Y or	X and Y
Y and Z	

by two of the recommended amendments. One of these would have the effect of increasing the maximum center-to-center distance between non-defective ties for Classes 4-6 track from the present 45 inches to 48 inches. This increase of three inches would allow for the "safe" practice of maintaining tie spacings at 23 inches. The present 45-inch maximum distance between non-defective ties does not, it is explained, permit any bad ties when a 23-inch spacing is used.

The other amendment having to do with crossties is intended to "clear up the confusion" created by the present rule specifying the minimum number of non-defective ties under a joint. The existing rule on this point does not cover the placement of ties. The new rule specifies where non-defective ties under joints must be located (see illustration).

● **Rail-defect size considered.** The proposed amendments also appeared to soften the requirements regarding defective rails. The original rules prescribed maximum operating speeds that would be allowed over rails with defects without regard to the size of the defects. "By taking into consideration the amount of rail failure that results from a particular defect and the nature of the hazard involved," said the preamble, "the FRA has developed new provisions that would provide greater flexibility in operating over defective rails until the rail is replaced.

"Under the new provisions no speed limit would be imposed over some defects. Instead a qualified person would be required to personally supervise each operation over the defective rail. This person could then permit whatever speed he considers safe based on his judgment of the situation."

Another significant change from the present requirements concerns the application of full-bolted angle bars to rails with defects. In many instances, it is noted, the stresses that may result where fully-bolted angle bars are used can create an unsafe condition. Consequently, in those situations where it is warranted, the FRA is proposing to adopt the "safer" remedy of applying angle bars bolted only through the two outer holes.

The new rules would also require reinspection of certain rail defects which tend to increase in size over a short period of time. They would, moreover, require replacement of a rail when it has a broken base with a fracture more than six inches long.

● **Use of track-recording cars.** One of the proposals recognizes the availability of track-recording cars and their increasing use on the railroads. The original standards required that track inspections be made visually by inspectors walking or riding over the track in a slow-moving vehicle. The purpose of requiring a slow rate of travel was to assure an accurate visual inspection of the track. "If a careful and accurate inspection can be accomplished in some other way," reasons the FRA, "its development should not be hindered by these safety standards." Therefore, a new provision is recommended which would provide an exception from visual inspection for any mechanical or electrical device that meets FRA approval.

● **Inspection at new rail.** A proposed change would defer the yearly inspection requirements for new rail if it is inductively or ultrasonically inspected before installation. The new provision would permit the "safe" practice of inspecting new rail before installation in track and not reinspecting until three years after its installation. Under the present rule, roads that install new rail are required to conduct an inspection for internal defects one year later.

A table in the present standards which sets forth the minimum number of track spikes per rail per tie would be revised. The change would require only two spikes instead of three in Class 3 track on curves between 4 and 6 degrees. It would separate Class 4 from Class 5 and eliminate the "unnecessary" requirement of three spikes in Class 4 track on curves between 2 and 4 degrees. It would also reduce the number of spikes required in Class 6 track from three to two, "a more common usage and one consonant with minimum safety requirements."

Other proposed changes would:

—Allow supervisors and track inspectors to qualify after passing an approved training course in lieu of having one year of experience.

—Revoke a provision requiring certain permanent markings on curves in Class 4, 5 and 6 track.

—Expand inspection and record-keeping requirements to include switch and track-crossing inspections.

—Clear up a "possible misunderstanding of what measurement is used when track is measured when not under load." ■

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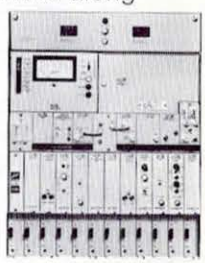

Specifically, the 36A multiplex has been designed for light route service. It's expandable in single channel increments up to 72 channels. And, up to 192 channels using supergroup equipment.

All channel units are identical, with the frequency determined by a plug-in oscillator. This allows a considerable savings in spare-parts inventory—instead of complete channel units for each operating channel, you only need a single channel unit and a spare plug-in oscillator for each operating channel.

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To find out more, write GTE Lenkurt, Microwave Systems, 1105 County Road, San Carlos, CA 94070.

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Circle 9 on coupon page 33

Moving People

BART TO ACQUIRE 200 MORE ROHR CARS

Directors of the Bay Area Rapid Transit District voted Sept. 28 to acquire an additional 200 cars from the Rohr Corp. (on top of an earlier order for 250). The initial contract is for 100 additional type "B" cars, to be delivered between Oct. 1, 1973, and Sept. 30, 1974, with an option for another 100 to be delivered by Sept. 30, 1975. Total price per car will be around $370,000, including a $10,000 allowance for spare parts.

RONAN IS TRANSIT'S "MAN OF THE YEAR"

Dr. William J. Ronan, chairman of the New York Metropolitan Transportation Authority, received the American Transit Association's Jesse L. Haugh "Man of the Year" award during ATA's annual meeting in Seattle late in September. Dr. Ronan was cited for "achievements in the New York region which have demonstrated to the urban areas of the nation and the world what can be done to improve public transportation facilities when they are subjected to energetic and innovative leadership." More than 1,300 people attended the Seattle meeting, a record for ATA get-togethers. Stanley H. Gates, general manager of Rapid Transit Lines, Inc., of Houston, was elected president of the association, and Robert T. Pollock, general manager of the Cleveland Transit System, was named vice president.

RAIL PROSPECTS DIM IN SEATTLE

Seattle voters, who have twice rejected rail-transit proposals, went back to the polls Sept. 19 and approved a three-tenths-of-a-cent transit sales tax that will help fund a $98-million, all-bus, county-wide system. The tax will yield about $10 million a year. The vote created a unified Metro transit system for the Seattle area, and die-hard rail-transit advocates view this as a step toward an eventual rail system. But most observers think the rail proposal, which would cost more than seven times what the all-bus system will cost, is dead for the foreseeable future.

REDUCED FARES ATTRACT ATLANTA RIDERS

In the first six months of its new 15-cent fare, the Metropolitan Atlanta Rapid Transit Authority picked up 5,250,000 new riders—a 25% increase over the year-earlier period, when the fare was 40 cents. MARTA's reduced fare is part of an over-all master plan, locally funded by a 1% transit sales tax, which calls first for bus improvements, followed by construction of a rapid transit system consisting of 50 miles of rail and 14 miles of express busways. Total cost: $1.3 billion.

ATLANTA GETS $3.2-MILLION GRANT

UMTA on Sept. 13 awarded a $3.2-million grant to the Atlanta Regional Commission for design and system engineering studies for Atlanta's proposed rapid transit system. The money will be passed to the Metropolitan Atlanta Rapid Transit Authority for actual disbursement. Local one-third matching funds of $1.6 million will be provided by MARTA, bringing the total design costs of the project to $4.8 million. In all, UMTA has awarded $34 million to MARTA for its proposed subway, construction of which is due to start in spring 1973.

AVCO-GE SIGN $10-MILLION CAR BODY ORDER

An initial contract for more than $10 million has been signed by Avco Corp.'s Aerostructures Division with General Electric for commuter car bodies. Avco will produce stainless steel car bodies for cars ordered from GE. The first order covers 214 cars GE is to supply to the Southeastern Pennsylvania Transportation Authority and New Jersey's Department of Transportation. The cars will be 85 feet long, 10 feet wide and will seat 127 passengers. First of the car bodies are expected to be off the production line by the end of the year.

BECHTEL, PBTB WIN SAO PAULO CONTRACTS

A contract to assist in installation of the first 15 miles of track on the new Sao Paulo (Brazil) Metro system has been awarded to Bechtel Inc.; additional work involving engineering and start-up services on the same segment has been awarded to the joint-venture team of Parsons Brinckerhoff-Tudor-Bechtel. When completed, the Sao Paulo Metro will total about 90 miles.

DEAL FOR FRENCH TURBOS REPORTED NEAR

Washington sources have confirmed reports (RA, Sept. 11, p. 15) that negotiations are under way for Amtrak to acquire French-made Turbotrains for high-speed corridor service in the Chicago area. Last week Amtrak officers were reported to be awaiting a firm dollar proposal from France. The train under consideration is a second-generation turbo-hydraulic of the type that has been running successfully in France for some time. Amtrak is also extremely interested in Britain's advanced passenger train (APT) but points out that revenue models won't be available in the immediate future. Meanwhile, Amtrak is pursuing plans for experimental auto-ferry service on the West Coast. Single-level enclosed auto-carriers built by Auto-Liner Corp. could be in service on Amtrak's Seattle-San Diego schedule by late October.

GE "systems approach" produces NH Cosmopolitans

By FRED N. HOUSER, Mechanical Editor

Late this year Penn Central plans to begin revenue operation of the first of 144 "Cosmopolitan" electric multiple-unit cars on the former New Haven commuter line between New York City and New Haven, Conn. The interstate nature of this operation has involved both New York's Metropolitan Transportation Authority and the Connecticut Department of Transportation in the $60-million order now in production at General Electric's new car building facility at Erie, Pa. Each of the state agencies ordered 72 of the cars.

Rehabilitation of the New Haven service is being achieved with the assistance of a Federal grant. According to Bryce W. Wyman, vice president and general manager of GE's Transportation Systems Division, the last of the Cosmopolitans will be ready for service by the fall of 1973.

● **Smooth transition.** Assuring a smooth transition from the existing aged equipment on the New Haven lines to 100-mph units described in some quarters as "the most complex cars ever built" has involved a systems approach by the builder. Edmund van S. Claxton, general manager of GE's Transit Systems Department, stresses the General Electric capability as an "integrated supplier" in the production of the new vehicles.

Long a supplier of transit and commuter car components, GE has now evolved into a supplier of complete cars. The most spectacular step in this transformation was the construction of the $14-million, 350,000-square-foot facility in which the New Haven cars are being produced at Erie (see cover).

The decision to become a prime contractor in carbuilding involved careful management analysis at General Electric. This was precipitated early in 1970 as GE was faced with the decision of the Budd Company to withdraw from production of electrically propelled passenger cars. GE stood to lose a major customer.

● **Prospects and problems.** One possibility was to withdraw from production of electric traction components. In looking at the prospects and problems, GE did a thorough analysis of errors made in the industry—involving cars with which GE had been associated and those involving other suppliers.

THREE-AND-TWO seating is like that first used on MTA's Long Island cars.

A major problem, according to van Claxton, has been the "anarchy in the industry" which GE sees best solved by a real systems approach involving the sole responsibility of a prime contractor.

With the growing market for rail transit vehicles to assure urban mobility, GE's problem was one of assuring that its entry into the field could be profitable. It would take total systems en-

The cars symbolize the progress which a $100 million modernization

gineering with follow-through that assured that the user understood and liked the equipment with which he was being supplied. GE people, along with consultants, participated in this stage of the planning.

While its own Erie facility was not yet built, GE won four contracts covering 330 cars for MTA operations, subcontracting the assemblies to Budd. For GE, according to van Claxton, this was a "valuable learning experience" in which the procurement, purchasing and quality control techniques involved in carbuilding could be developed. GE also has handled the introduction of the 152 M-1 (or Metropolitan) type cars on the Long Island and 178 Harlem and Hudson cars on Penn Central.

As Budd proceeded with the GE contracts, MTA and CDOT began rehabilitation of the New Haven commuter service. Louis T. Klauder & Associates was retained by the public agencies to prepare specifications for a vehicle which, while retaining the look of the LI M-1, would be considerably more complex since it would involve operation from 600-volt DC third rail in and out of Grand Central Terminal and from the ex-New Haven 11,000-volt AC catenary a few miles further north. As it finally evolved, the car has both a heavier shell and greater over-all weight than the M-1 while retaining the lines and interior arrangement used on LI.

The GE transportation organization already has a propulsion engineering capability and now proceeded to build a car-design organization, drawing from Budd as well as from its own and other aerospace operations. It was at this stage that a decision was made to contract the fabrication of car shells, rather than tooling the new plant for this space-consuming operation. Once GE had been awarded the MTA/CDOT order, it found no U.S. bidders for the stainless-steel shells and is having the job done by Canadian Vickers. The next major car program for the Erie facility, 214 cars for the Southeastern Pennsylvania Transportation Authority and the New Jersey Department of Transportation, is scheduled for 1973-1975. Avco Corporation's Aerostructures Division at Nashville, Tenn., will produce the stainless carbodies, again shipping them by rail to Erie.

PROTOTYPE underwent a winter's testing at Erie where 5-mile test track has recently been equipped with European-style catenary capable of transmitting 50,000-volt AC.

● **Distinctive feature.** For the technically minded, the most distinctive feature of the 85-foot New Haven car is the roof mounting of the braking resistors. Traditionally they have been under the body where they are susceptible to damage. The new arrangement allows heat to dissipate into the air, not into nearby components. This increases the accessibility of all equipment for maintenance. Great emphasis has also been placed on delivering clean cooling air to all electrical components.

In addition to the GE propulsion and controls, the New Haven cars have General Steel Industries trucks, Westinghouse Brake & Signal pneumatic braking, U.S. Plywood interior finish, Vapor Slimline door operators, Bostrom seating, floor coverings consisting of RCA tile and Stevens carpet, Trane air conditioning and Motorola radio and public address systems. The double sash units are fitted with Lexan thermoplastic for rider protection.

● **Prototype testing.** In November and December 1971, a prototype Cosmopolitan was assembled in the Erie shop. For the remainder of the winter it was subjected to an extended series of "static" and "dynamic" tests. In the static phase in the shop, the car was subjected to a computer-programmed test of every operating mode—a process which can take weeks when done in the traditional manual manner and which requiries about four hours when accomplished electronically. This appraisal of every subsystem under environmental conditions varying from minus 20 deg to plus 110 deg F continues now that the assembly lines are turning out the complicated cars four abreast.

On GE's 5-mile test track the prototype was operated over 2,000 miles, making 200 changes from AC to DC and DC to AC as required in regular service. While this was not part of the MTA contract, the delivery of the first three pairs of finished cars to New Haven property was to be followed by 8,000 miles of non-revenue testing. This has involved the change from the overhead AC catenary to the underrunning DC third rail, stops at every station with opening and closing of doors and scheduling as close as possible expected of the cars in actual service.

Rigid "configuration control" has been imposed on its own designers, as well as those of its suppliers, by the Transit Systems Department. This is another step in assuring the uniformity and reliability of the fleet. As problems have developed, van Claxton has stressed the importance of determining exactly what the problem is and then field testing the "fix." He is particularly proud of the organization and its ability to react rapidly as problems have cropped up.

Quality control is being imposed at every stage—at vendors' facilities, during assembly, and in final test. In a production test, for instance, the doors were operated for 250,000 cycles. This has been followed by the MTA requirements for on-line testing.

Reliability, according to van Claxton, is the product of careful systems engineering, quality control, careful assembly, and rigorous testing.

● **Training is vital.** Another example of

program on the New Haven line is advancing

the systems approach is the on-line training GE is now conducting for Penn Central employees who will operate and maintain the Cosmopolitans. Since June, GE instructors have been familiarizing electricians and mechanics, along with their supervisors, with the workings of the entire car—from doors and door controls to traction motors, gear boxes, brakes and even the toilets.

Robert K. Pattison, general manager of PC's Metropolitan Region, recently explained that "the new electric cars are so advanced over anything we have on the New Haven today that it is essential that every employee be given extensive training so that we can operate and service these cars efficiently. Because of the dual electric power system using both AC and DC, these cars are more complex than the new cars we have for the Harlem and Hudson lines."

● **Prevention over correction.** GE instructors are placing great emphasis on preventive, as well as corrective maintenance. Alfred C. Garmon, product support manager for GE's Transit Systems Division says: "Staying on top of a car's performance continuously will produce substantial cost reductions. Our training techniques are becoming increasingly sophisticated, based on experience. With the Harlem and Hudson, we are training PC maintenance people before deploying the cars. If we expect our customers to properly maintain GE cars, we must provide a first rate training program."

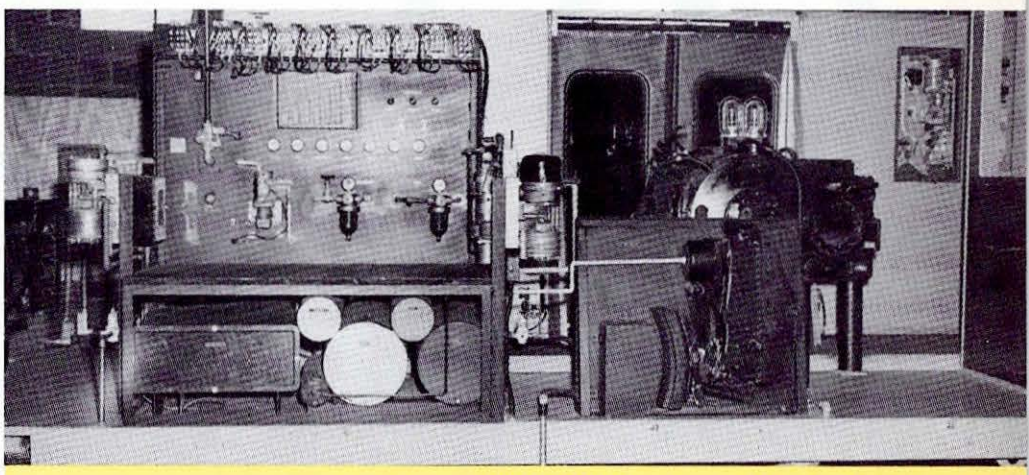
GE produced a 60-foot simulator containing all the mechanical systems of the New Haven cars, including a fully equipped motorman's cab and the sliding side doors. It contains cutaways so PC employees can view the actual working of the various subsystems. And, although most of the electrical and mechanical equipment is beneath the floor on the actual cars, it is mounted in full view of the simulator.

● **Sophisticated instruction.** Four GE technicians from the product support group have been thoroughly trained as instructors, specifically for the New Haven car and its sophisticated systems. At the New Haven, Conn., shop where the simulator is now located, GE instructors are teaching everything from basic electricity to the relationships and functions of the car's coordinated systems—propulsion, controls, brakes, heating and air conditioning.

The working replicas have wiring and piping color coded to clarify functioning. Split-image slides, one side with color schematic and the other with a photograph of the actual equipment installation, are used. "Bugs" are established in the car so New Haven line student/employees, using electronic testing instruments, can detect and correct the faults. Classes vary in length, depending on the employee's work, from about one week to more than three. The entire instructional program is expected to last until mid-1973 by which time the Cosmopolitans will have taken over much of the New Haven service.

High-level platforms for the new cars are being built at all New Haven stations from Mount Vernon, N.Y., to New Haven and on the New Canaan Branch. The new cars are to replace all locomotive-hauled commuter trains on the New Haven, except for the Danbury and Waterbury (Conn.) branches. When the Danbury branch is again electrified, Cosmopolitans will also be used there. MTA and CDOT have acquired all these properties from Penn Central.

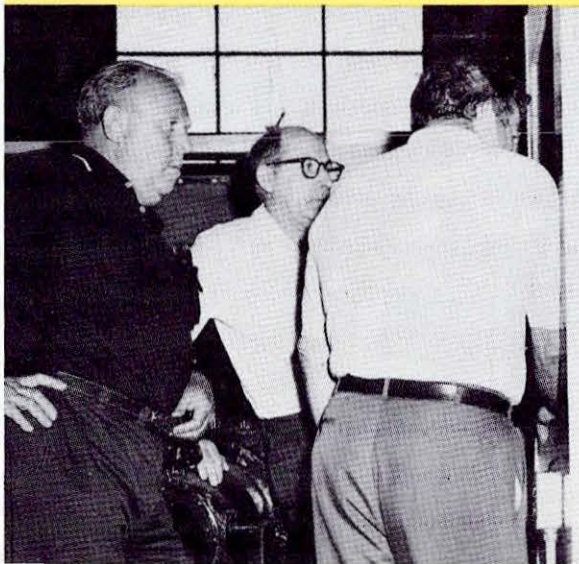
MTA's Chairman William J. Ronan has observed that the new cars "symbolize the progress which a $100-million modernization program on the New Haven line is advancing for the public's benefit." ■

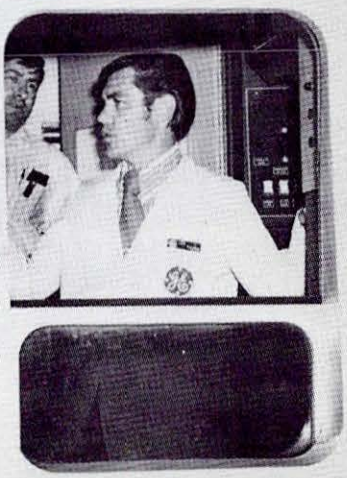


SIMULATOR has displays of subsystems, many of which are mounted under actual car and would not be easy to demonstrate.

CAB of simulator has complete set of controls, including a two-way radio, to assist in training enginemen.

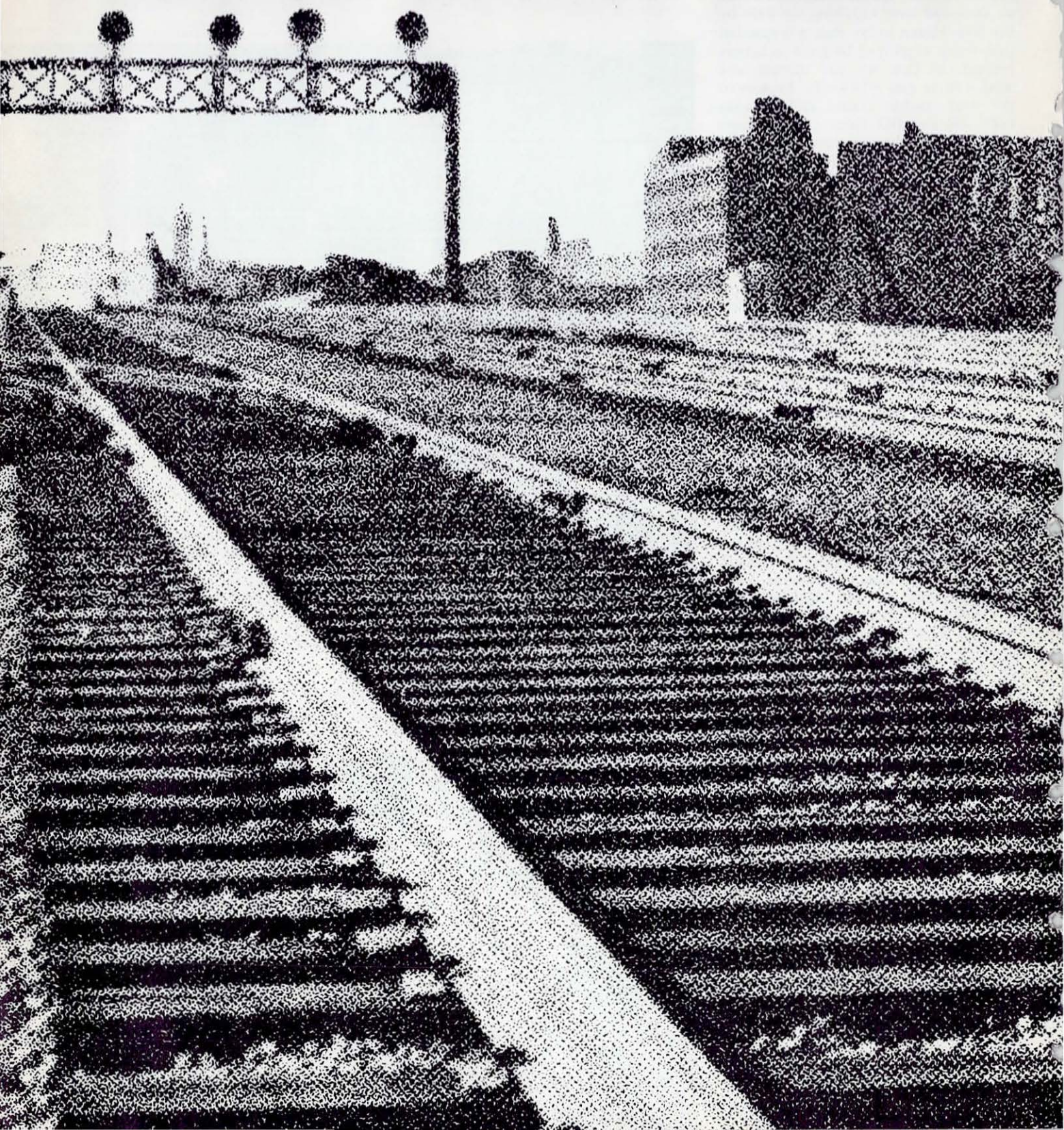
BRAKING is explained by GE instructor to group involved in maintenance and operation of New Haven line equipment.





An open letter to the railroad supply industry:

THE RAILROADS NEED OUR HELP!



Passage of The Surface Transportation Act of 1971 (Hartke-Adams Bill) is vitally important. Enactment will help the railroads regain financial stability and enable them to rebuild. And this is important to all of us.

We should make our collective voice heard to help get the legislation our customers so desperately need.

Here is what Edgewater has done. We would like you to consider doing it, too.

A letter was sent to our state senators and congressmen, and to each member of the Senate and House Commerce Committees, stating our concern over the railroad economy and the imminent danger to the job security of hundreds of thousands of people. Approval of House Bill 11207, and Senate Bill 2362, was urged.

It was endorsed by more than 400 Edgewater employees.

We've been putting wheels under America's railroads for over 50 years. Now, we wish you would join us in putting wheels under this legislation. Let's help the railroads. Let's help ourselves. Let's write, immediately.

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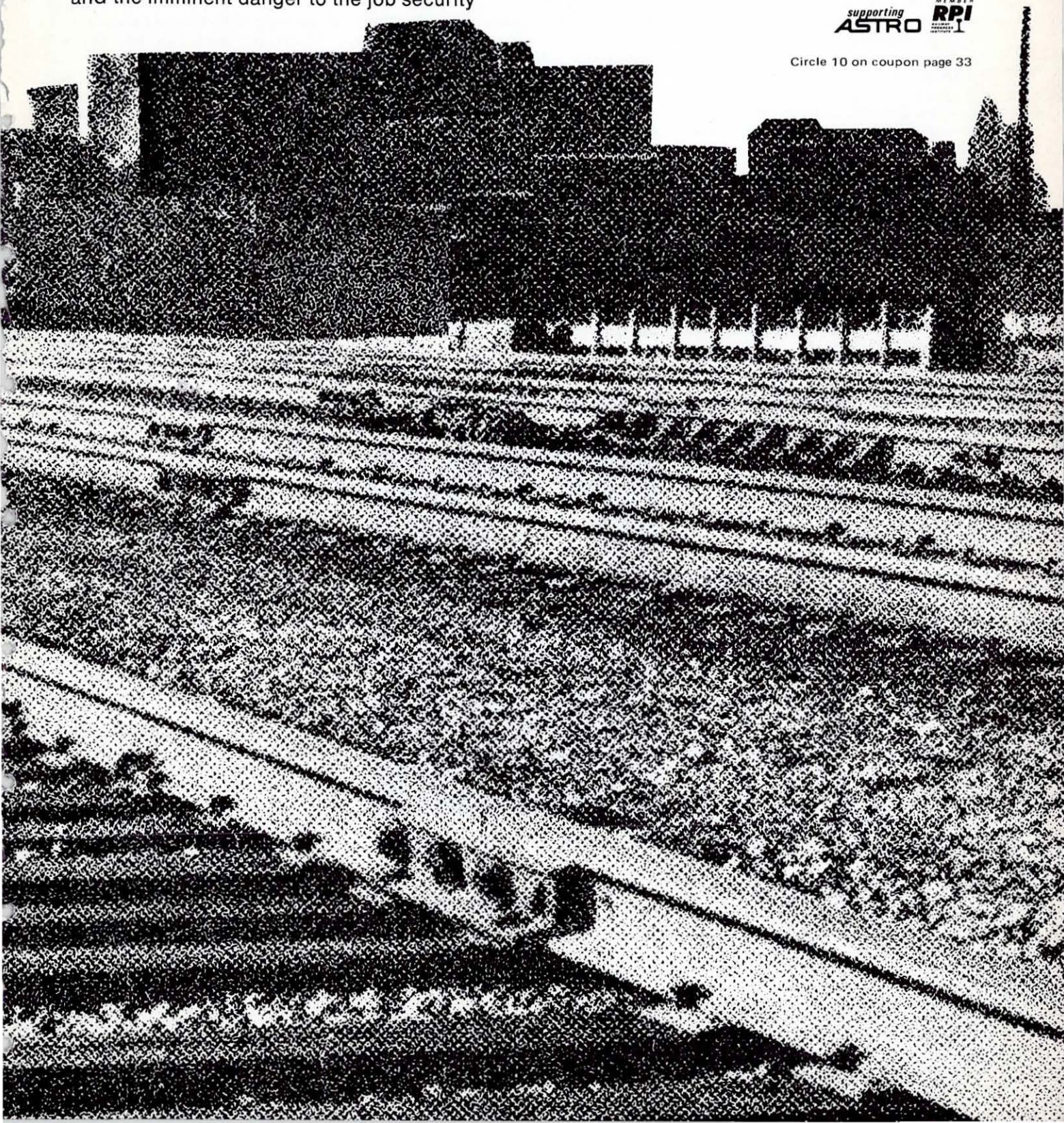


3,000 attend technical sessions and view exhibits in Chicago

"Railroad Week in Chicago" was actually two weeks this September—and upwards of 3,000 railroad and supply-company officers took advantage of the opportunity to (1) attend working sessions of the Coordinated Associations, the Roadmasters and Maintenance of Way Association, the Bridge & Building Association, the AAR Communication & Signal Section and the AAR Data Systems Division; and (2) tour exhibits presented by the Railway Supply Association and the Railway Systems Suppliers.

Scattered among the program sessions were addresses by a number of top-level railroad officers—and if there was a common thread to these presentations, it might be summed up this way: Railroads had better hang together—because otherwise there's a good chance that they'll hang separately.

● **The technical and the social.** Not surprisingly, there was twinned emphasis—on both the technological and the social aspects of railroading in the future. Southern Pacific President B.F. Biaggini, for example, noted five "pretty sure bets" for tomorrow:

—There will be opportunity for railroads "to increase traffic by 40% in just five years and probably to double it in just the next 10 to 15 years, if we are only ready to handle it."

—Costs are going to keep inching up "and revenues almost surely are going to keep lagging behind those increasing costs. So we have to look harder for the savings."

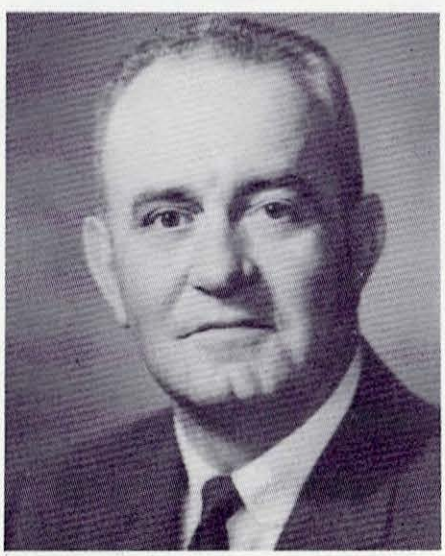
—The maintenance job "is never perfected, yet perfection must always be the goal."

—Government "is going to impose additional safety standards, and public standards for environmental controls also are sure to increase. These things are going to raise our costs, in terms of both materials and management. How much, no one can say at this time. Nor can we be sure what part of the costs can be recovered. What we do know is that if we don't work diligently to set good standards for ourselves and do a good job of self-policing, then others will insist on doing it for us and doing it more expensively. No one is better qualified than we, ourselves, to establish and maintain reasonable standards in these areas, and we want to do as much of this as possible for ourselves—not have it dictated to us."

—Customer service requirements "will escalate, not only in terms of greater speed and dependability but also in terms of equipment we will be expected to furnish. Car design will continue to be influenced by the shipper's need for reduced labor cost in loading and unloading and by the railroads' need to reduce unit costs of handling shipments. These needs won't always be compatible." For this reason and others, "Research and development for customer service as well as for our own more efficient operations will continue to be absolutely vital. And as we pursue these twin objectives we need to have firmly in mind that the pace of competition in this entire field guarantees the obsolescence of some of our equipment and some of our methods."

● **The "what"—and the "how."** With the future challenges in mind, Biaggini also put forth a few suggestions as to how performance might be improved:

—First, "we must stay keenly aware of our interdependency, pursuing our group interest as much as we do our self-interest and looking after those effective communications which are so imperative today."



"We must vigorously encourage an integrated industry/union/supplier/government approach to research and innovation"

B.F. Biaggini
President, Southern Pacific

—Railroads "must step up our emphasis on quality control on everything we are using to do the job today."

—"To get ready for the big job tomorrow, we must vigorously encourage an integrated industry/union/supplier/government approach to research and innovation, nationally and internationally."

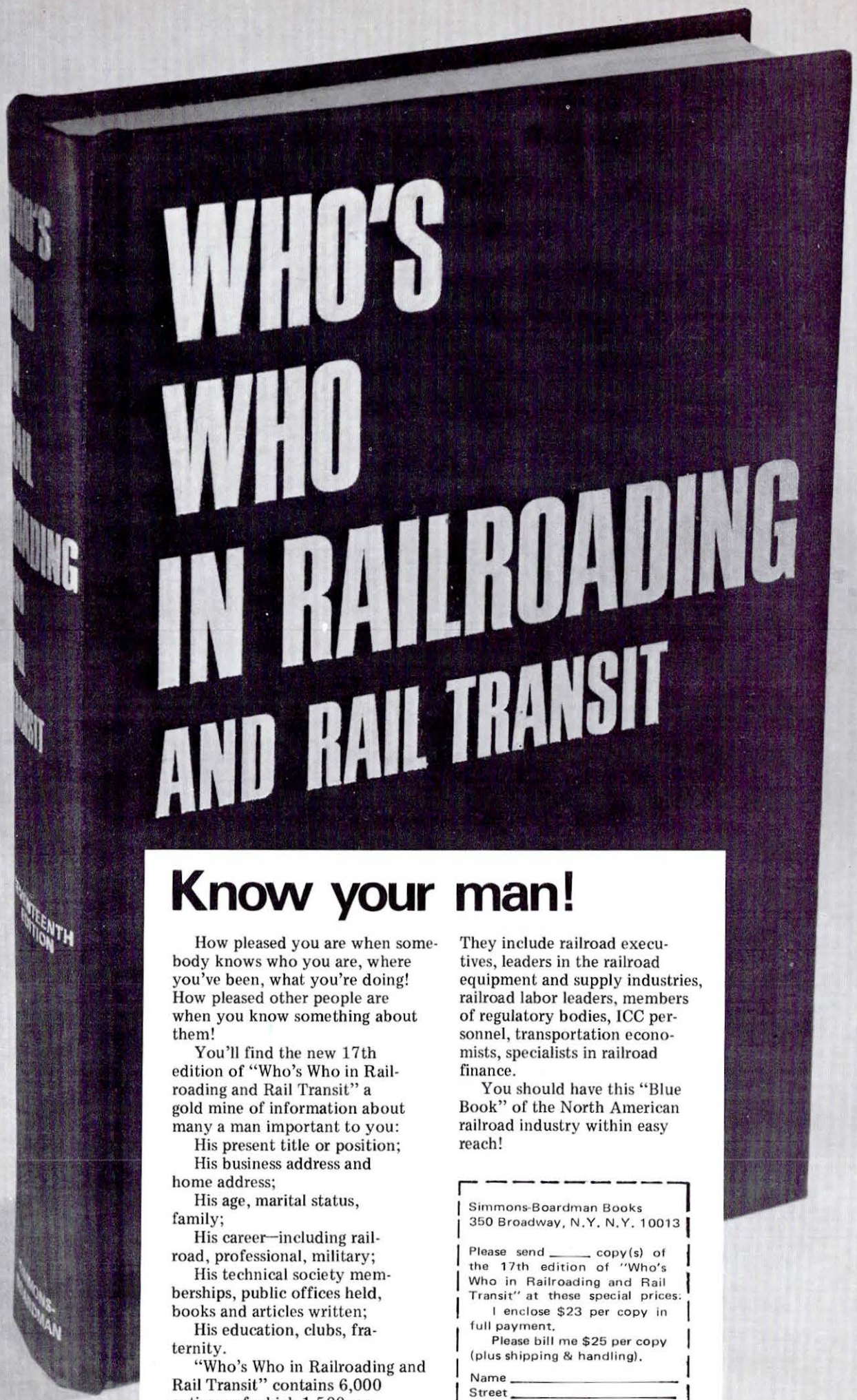
On that final point, SP's president had this comment: "We must do much more to pool the great creative talents on our railroads and among our suppliers and potential suppliers and also to involve government resources to line up the necessary people and money to support well-directed, industry-wide research which will truly be in the national interest. And we have to demonstrate solid progress as managers on all three of these points if we are to expect the public, through the Congress and the Administration, to give us the help which we need and deserve on the other problems we have. I believe that we can do that."

Another challenge came from John F. Nash, trustee and chief operating officer of Lehigh Valley, who put the problem into context in the Northeast and then talked of how and where change is needed:

"Innovative changes must be forthcoming within the industry in marketing, in sales, in operations, in labor, in intercorporate relationships. There must be change in the thinking of Congress, change in the thinking of state legislatures and change in the thinking of units of government down to the smallest township."

Nash defended management: "I defy without reservation the charge that railroad management has not been innovative. . .If railroad management can be faulted, I say it's because it has not blown its own horn." He also saw more pro than con in current government attitudes: "We have a few people in high places in Washington whom I would have to accuse of not doing their homework and determining what nationalization actually means. On the other hand, we have a lot of very intelligent people in Congress who, we hope, will see the folly of a drift toward Federal takeover of the railroads. . .We have noticed the

(Continued on page 35)



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Circle 11 on coupon page 33

New Products Report

Log Chipper can handle wood pieces up to six feet long

A powerful, new, heavy-duty machine—the 671 Log Chipper—that chews railroad ties, logs and other pieces of wood into chips in minutes has been introduced by Vermeer Manufacturing Co. It will handle any piece of wood up to four feet in diameter and six feet long. The all-hydraulically-operated unit is powered by a 391-cu.-in. Ford engine or 453 GMC diesel. The machine, featuring a high-speed 8-in.-diameter rotary cutting cylinder, contains the wood in a heavy-duty hopper which hydraulically feeds it over the cutting cylinder at 15 cycles a minute. The cylinder, with 45 carbide-tipped cutting teeth, chews the wood to chips at speeds up to 1,800 rpms. Remnant chips are carried by conveyor to the front of the unit and deposited on a second conveyor which puts them into a truck or on a pile. The 671, easy to transport from job to job, also features a trailer-type axle system which lets the operator move in close, eliminating unnecessary wood hauling.

Circle 60 on reader service card

Rail-Head is available in a new, improved model

Major improvements have been made to LaMere Industries' Rail-Head, an incinerator-type toilet. The improvements center around a new cast combustion chamber and a more efficient 45-deg. angle burner. Rail-Head is standardized to LP gas use, but has provision for easy conversion to natural gas. A non-polluter, the toilet does not use such things as water, chemicals or holding tanks.

Circle 61 on reader service card

New system detects wheel cracks while rail cars are in motion

WHeeLFAX, a completely automatic ultrasonic "in-motion" railroad wheel inspection system, has been developed and produced by Scanning Systems, Inc. The system is available for in-track installation on railroads and rail transit lines to detect cracks in locomotive and car wheels before they grow large enough to cause failure.

At train speeds of 0.1-30 mph, every wheel passing over the rail search unit is tested circumferentially several times in both clockwise and counterclockwise directions. Wheel tread surfaces unsuitable for testing—because of such things as heavy pitting, heavy rust, severe spalling and flange oiler grease—result in a "no-test" signal on the record tape or alternate output device.

Signal outputs from WHeeLFAX can be used to operate paint guns, alarms, recorder chart pens and alphanumeric tape or can be interfaced with existing car identification systems and computers.

Circle 62 on reader service card

Vibratory table compacts a wide range of materials

An automatically sequenced vibratory table for compacting a wide range of materials is offered by Cleveland Vibrator Co. Storage and/or shipping containers can be easily vibrated without removing them from an automated system. Control panels are available that require only initial energizing by a single switch. Timers then regulate the cycling of the table drives and deflation of the air isolation mounts. Additional benefits cited by the manufacturer's engineers: up to 25% more material after compac-

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tion, meaning every fifth container is shipped and/or stored free; elimination of damage to containers while in transit; air or electric powered table drives are available (both are engineered and designed to meet all OSHA noise-level standards); a wide range of table sizes and designs, with small units handling less than 10 pounds and heavy-duty units handling over 15,000 pounds.

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Cleaner made for heavy-duty transportation equipment

A new product for cleaning heavy-duty transportation equipment has been developed by Turco Products, division of Purex Corp. Called Turco Meteor, it can be used on railroad and construction equipment, trucks, trailers and tractors to clean all metal, plastic, vinyl and glass parts. Turco Meteor is a water soluble, biodegradable solvent containing ammonia. Effective in a wide range of concentrations, depending upon the soils, it may be applied by spray or by hand.

The material presents no fire hazard; it is comfortable to work with; it will not streak or stain aluminum nor will it damage well-bonded paint (it helps restore luster to paint); and its free rinsing properties eliminate streaking of painted surfaces.

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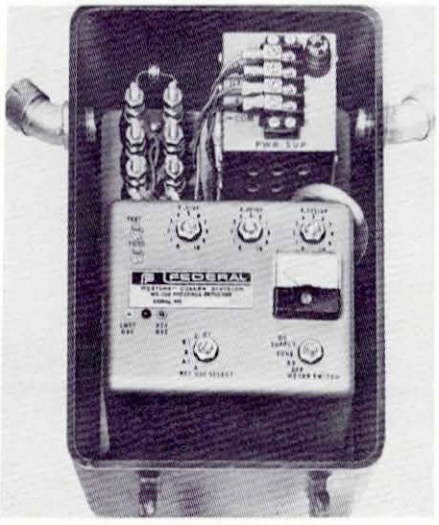
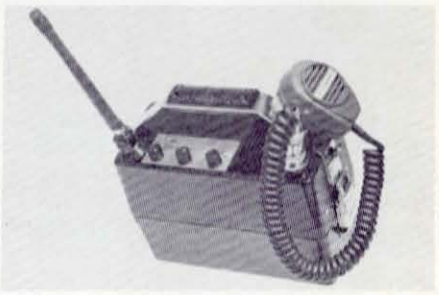


Presence detector has an automatic tuning circuit

The WC-300 presence detector is designed to reliably indicate occupancy of short sections of track, such as for detector locking of classification yard switches or for electric switch lock release. It can be used either independently or in conjunction with track circuits.

The WC-300, made by Western-Cullen Division of Federal Sign & Signal Corp., has an auto tune circuit that compensates for detuning caused by rain, snow or change in rail inductance and track structure movement. The WC-300 presence detector is completely solid state. The unit has built-in test equipment. The advanced electrical system is protected against electrical surges and is immune to false tuning. And, neither car motion nor rail shunting is necessary for detection to occur.

Circle 65 on reader service card



5-watt walkie-talkie has 5 channels

The WABCO 5-watt Carryphone provides five-channel capability. The unit comes with a single set of crystals, but up to 4 more frequencies can be added at any time. Also available as an option is a 2.2 watt RF output model. The Carryphone has a plug-in battery box. In addition, a complete choice of power is available; rechargeable nickel-cadmium batteries, mercury batteries, or a standard "D" battery pack.

Circle 66 on reader service card

"Impregnable" padlock now available for U.S. railroads

Exclusive railroad sales rights to sell the "Impregnable" padlock in all subway, mass transit and personal transit markets in North America have been obtained by General Railway Signal Co. GRS will offer two models—922 and 923. Each comes complete with two keys; over a million different key combinations are available, and master keyed locks can be furnished. Model 923 is a high-shouldered railroad switch lock.

The padlock affords a degree of security never before attained, says GRS. It is being used by many governments to secure nuclear weapons, munitions, small arms and ammunition storage areas. The heart of the padlock is its exclusive key cylinder. Each cylinder has 10 pivoted nickel-silver levers—twice as many as most other padlocks—making it more resistant to picking. In the locked position, two high-tensile steel ball bearings are engaged in grooves in the case hardened shackle. The shackle and locking mechanism have withstood a pull test of 8,000 lb.

Circle 67 on reader service card

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3,000 attend Chicago meetings

(Continued from page 30)
beginning of a new and cooperative spirit among the regulatory agencies. . . This new spirit is encouraging. It's a breath of fresh air and we can see here a new atmosphere being established. The old cut-and-dried rules are being discarded and new rules are being considered to meet the changing times."

● **"We need the railroads."** Western Maryland President W.P. Coliton also touched on the nationalization issue, with a positive slant: Given a choice, he said, "I think most people would agree that we need the railroads for a lot of reasons. I think most would be willing to help make them viable. I think the majority of the American people do not want nationalization. I think they look on it as creeping socialism. I think they want the railroad industry to solve its own problems, given a fair chance. And I think that, given a fair chance, this can be done. We have the ability, the know-how and the desire to get the job done. . .And I'm confident that the job will get done."

Rock Island President William J. Dixon zeroed-in on technology and its relationships to the total environment:

"The continued application of scientific knowledge to improve railroad facilities, equipment and operations is critical to the economic well-being of our industry. There is mutual interdependence here. The technology supports the system, but the system must be healthy to support the technology. We must have the benefit of innovations if we are not to be surpassed and perhaps eventually supplanted by other forms of transportation."

Sometimes, Dixon said, "I think we are too closely tied to the past. We accept without question levels of performance which would be unacceptable anywhere else. Often we're told that we must accept poor performance because, for example, it would be too costly to build into equipment a higher degree of reliability. Yet I wonder in such instances if we have considered all of the costs, such as the investment in what amounts to standby equipment to take over when the inevitable failures occur."

● **Change: Seek it out.** RI's president had this observation on what won't and what will promote R&D and what R&D can do: "I don't think technological advancement will come by government fiat. You can't legislate innovation. In fact, too much bureaucratic intervention stifles creativity. The railroads and their suppliers must have an environment of freedom and flexibility.

"Research cannot be relaxed. You have probably read accounts recently about how research in the United States has fallen behind other parts of the world in almost every field of endeavor. Railroads have experienced perhaps more of a lag in research than many other fields. And there is no assurance that railroads in their present form are indispensable. In fact, for many purposes for which they served in the past but for which they no longer serve, just the opposite is true. But constructive change is the order of the day. It should not only be welcomed but sought. As some functions of the railroad become obsolete, new ones must be found to take their place. Out of stepped-up research will come the new ideas so essential to progress."

OSHA no threat, M/W men told

Following up on addresses by Presidents Biaggini and Coliton, the Roadmasters' and Bridge & Building groups, at their joint sessions in Chicago, were interested listeners to several other talks on subjects of particular concern at this time.

● **Impact of OSHA.** A speaker who evoked close attention was Charles S. Wolff, technical advisor, industry, Occupational Safety & Health Administration. Wolff appeared to be intent on quieting whatever fears M/W men might have regarding the effect that OSHA might have on them and their work. The purpose of the act creating OSHA, he said, was to determine that employees are provided with safe and healthy working places, thereby conserving human resources.

Speaking of exceptions to the act, Wolff said OSHA does not apply where some other government department has authority. However, he did imply that there is an "interface" of authority between the Department of Labor (OSHA) and the Federal Railroad Administration. Saying that he would "feel like a fish out of water on the railroads," Wolff described the railroad profile in OSHA as "very low." This was another way of saying that the railroads are low on OSHA's list of priorities. At the top of this list are investigations of fatalities. Next are investigations of complaints. Third is a program dealing with "target health hazards" which include silicon, lead, carbon monoxide, asbestos and cotton dust. This effort is applied "across the board" in industry, but the railroads are not involved.

"I defy without reservation the charge that railroad management has not been innovative"

John F. Nash
Trustee, Lehigh Valley

OSHA's primary function seems to be the investigation of complaints. The procedure followed with respect to complaints involving the railroads is in accordance with an "interim agreement" between FRA and the Department of Labor. If a complaint on a railroad situation is received by OSHA, it is referred to OSHA's regional office which takes it up with FRA personnel at the same level. The agency that is found to have authority will then make an inspection and take whatever action is indicated.

Safety also came into the picture in an address, "Safety Is No Accident," by G.M. Leilich, operating vice president, Western Maryland. In furthering safety on the railroads "we must deal with a new kind of understanding which requires a new kind of input than ten years ago or even five years ago," said Leilich.

"Today's worker is much more sophisticated than yesterday's worker. He dislikes paternalism, and certainly he does not like to be given orders to be required to do something which serves no useful purpose in itself. . .For example, why should it be required to wear hard hats in an engineering office? Should we not custom-design our safety regulations to a greater extent than in the past?"

● **Black Mesa line described.** The

country's newest railroad was described in another address before a joint session. This is the Black Mesa & Lake Powell, under construction in Arizona. The speaker was J.F. Pearce, project director for Morrison-Knudsen Co., Inc., which has a turnkey contract for designing, equipping and constructing the new line.

An electrified line, the new railroad will be 78 miles long and is being built to haul coal to a new electric generating station near Page in the northern part of the state. Features of the track are concrete ties, long welded rails and "glued" closure joints. Trains will be designed for automatic operation but there will be an "attendant" aboard who will be able to over-ride the automatic features if this should become necessary.

● **Report on concrete ties.** The separate sessions of the Roadmasters' and Bridge & Building groups were marked by a number of special features in addition to reports of committees. One of these features was a report on concrete ties by John W. Weber, senior transportation engineer, Portland Cement Association. Weber's remarks dealt mainly with the results of an inspection of several test installations of concrete ties on the Santa Fe, with considerable discussion of cracks found in some of the ties and the reasons for them.

Weber's report was made before a session of the Roadmasters' group. Another feature of the Roadmasters' program was a report by W.S. Tuinstra, special engineer, Santa Fe, on the so-called Kansas Test Track which is a joint project of the railroad and the Federal Railroad Administration (RA, July 10 p. 43). The two-mile test section, incorporating concrete ties, beams and slabs, is scheduled to go into service under regular Santa Fe traffic in November.

A Roadmasters' feature that attracted special attention was a two-part discussion of in-track butt-welding of rails. In one, the speaker was R.A. Hunziker, vice president, Railweld Division, Holland Co., who described the electric flash-butt method. The other speaker—L.N. Hambrick, board chairman, Railroad Maintenance & Construction Co.—described the oxyacetylene pressure method. Both methods are presently in use on the Santa Fe.

During Bridge & Building sessions the subject of prestressed concrete bridges was treated not only in a committee report but also in a motion picture showing the use of such bridges on the Japanese railroads. At the opposite end of the spectrum, the use of laminated timber stringers in railroad bridges was the subject of an address by Donald O. Barth, manager, engineering and computer sciences, laminated products department, Koppers Co., Inc.

Track/train dynamics key topic at Coordinated

Track/train dynamics was a recurring theme of the Coordinated Associations at their recent sessions. The problem, according to D.D. Strench, vice president, operations, Louisville & Nashville, simply becomes one of keeping the steel wheel on the steel rail. He then proceeded to describe L&N's in-house efforts to resolve this problem which plagues the operation of long, heavy freight trains on all railroads.

Strench told the Railway Fuel and Operating Officers Association how L&N organized its own track-train dynamics committee from its industrial engineering, maintenance of equipment, maintenance of way and transportation departments. In developing a train handling procedure, he explained, L&N uses the basic premise that there is but one right way to handle any train on any segment of the railroad under any set of conditions. He said this might be formalized by thinking of the steps that it would take to control the train remotely.

From a technical standpoint, L&N has determined that track standards must be higher and maintenance must be more precise to sustain the six-axle locomotives which it now operates. On certain curves larger tie plates are now used and more spiking is standard. From an equipment standpoint, closer inspection and tighter tolerances to assure the best possible riding of the big locomotives have been rated of great importance. Strench says that ultimately it is vital that a computer model be devised for appraising riding characteristics of freight cars so that problems such as rock-and-roll experienced with covered hoppers and extra-height box cars be pinpointed before the cars are built.

Chicago & North Western has had an accident analysis organization which now has a computerized record of all the road's derailments for the past five years. R.P. Hoffman, manager of C&NW train accident prevention, and now a member of the AAR track/train dynamics task force, called attention to the 15-mph speed limit which often has been associated with slow orders in the past.

Since this is the very speed which excites rock-and-roll in many freight cars, C&NW now has a policy which requires that if a train cannot negotiate a segment of line at 25 mph at least, the speed limit must be 10 mph.

Dynamic braking presents problems in the successful handling of heavy freight trains. A.E. Huston, district road foreman, Southern Pacific, noted that it is necessary to restrict the number and location of helper locomotives and to have reliable communications between lead and helper units to take full advantage of the retardation which can be developed by a train's motive power. He said SP uses helpers in dynamic braking for added retardation, rather than returning locomotives light down long grades.

R.D. Spence, vice president—operations, SP, identified as two of railroading's scarce resources the labor for maintenance and the materials for repairs, urging that the most efficient use be made of each. He added that railroads should only find it necessary to "care for, not coddle" the locomotives which builders are supplying today. He decried perennial problems such as engine water leaks and poor performance of solid-state electronic controls which should not have to be corrected in the field but should be thoroughly proven prior to their introduction in the working environment.

The Committee on Fuel and Lube Oil of the Locomotive Maintenance Officers Association devoted its entire effort to the environmental impact of railway motive power. "Currently a

"I think the majority of the American people do not want nationalization. I think they look on it as creeping socialism"

W.P. Coliton
President, Western Maryland

multitude of regulations exist regarding smoke emissions from locomotives," it was reported. "Many of these cannot be met under all conditions, even by new locomotives. Existing and new engines produced prior to 1975 may not be able to comply with certain state emissions requirements. Engine builders are committed to reducing the smoke in diesel engines and have taken steps by changes in hardware and engine operation to do so.

"There are no gaseous emissions regulations known. . .that are now law, except for a few relating to sulfur dioxide. . .Except for sulfur dioxide, fuel has little effect upon emissions when bought and used within parameters set forth by engine builders.

"It is extremely important that the various state regulations be as uniform as possible as the railroads are engaged in interstate commerce. The AAR and others are actively pressing for the Federal government to be granted the right to preempt all political subdivisions with respect to [emission] regulations which would apply to railroads."

The Car Department Officers Association was told of another facet of the environmental control problem as it involves railroad maintenance. A representative of PPG Industries discussed the regulations of 17 states as they control the application of paint and other protective coatings to freight cars. He noted, that like the quandary facing locomotive operation, an industrial coating operation may be shut down by regulation in one state while being allowed to continue to operate in another. The Federal Clean Air Act of 1970, while setting air quality standards for hydrocarbons and oxidants, did give the states the power over setting limits.

Mechanical refrigerator cars have also come under fire from pollution controllers. In addition to exhaust emissions from the diesel engines on such cars, there is now the problem of noise. The CDOA Committee on Controlled Temperature and Atmospheric Systems noted that one major private car line has established a program of installing new injectors on all reefer engines to improve combustion, is investigating fuel additives, and is now looking to the possibility of gas turbines as it seeks lower noise as well as lower emissions.

The problem of locomotive engine noise was discussed by LMOA. While airlines cannot be regulated by local or state ordinances, railroads failed to gain the same status under Federal regulations. There is now an effort to correct this situation. But certain railroads have been subjected to citations for violating various local noise control regulations. The AAR has been instrumental in getting the "Noise Pollution Control Act of 1972" introduced in Congress; it would bring railroads under exclusive Federal regulation.

Signaling and Data groups stress role of computers

"Man mastering technology for better railroading" might well have been the theme of the consecutive annual meetings of the AAR Communication & Signal Section and Data Systems Division in Chicago.

In recent years, with the explosive growth of computer usage, solid-state electronics and complex control systems, the question arises: Is man being mastered by technology?

● **Man in control.** Evidence from speakers, workshops and exhibits at the Sept. 25-29 meetings clearly indicated that man is still in control on the railroads. Computers are being treated as tools to improve railroad operations, not masters to control management. Four speakers reported on projects in various stages—from pilot to installed systems—where the computer is being used to aid men in operating the railroad:

—In a pilot installation at Inman Yard in Atlanta, Southern will provide an agent with a video display terminal connected to the road's central computer system to enable him to prepare waybills. Advantages of the new system, reports J.L. Jones, vice president-management information services, include a reduced amount of keying for the agent, improved accuracy, on-line editing, and faster billing. Use of Repetitive Waybill Codes—some 60-65% of Southern's traffic volume is eligible—gives users of waybill data, such as the agent, means to retrieve blocks of repetitive data from the computer.

"I don't think technological advancement will come by government fiat. You can't legislate innovation"

William J. Dixon
President, Rock Island

—Canadian National is working on a yard inventory project that is now in service at Edmonton and Toronto, with Montreal and Moncton yards to be operational later this year, and a Winnipeg system to be in service next year. The basic system consists of automatic car identification scanners covering all entrances and exits from the yard, feeding into a minicomputer. Additionally, an aci scanner is located at the hump crest to monitor cars moving toward the class yard.

While admitting that the aci yard inventory projects are not technological revolutions, R. Cass, senior research engineer, calls them commercial revolutions. For $70,000, CN is able to provide a complete computerized inventory of a 10,000-car yard. The projects so far are at major CN yards, but the concept could make it economically advantageous to provide computerized inventory in small flat yards.

Some 70% of the savings from the system at Calder Yard in Edmonton, says Cass, come from reduction of errors. The aci at Edmonton will provide a 40% return on the investment, based upon a five-year life. Studies on CN showed that it cost $5-$8 to correct an error in the central data system in the road's headquarters. Much of this is due to the fact that often several reports have been generated by the time the error is detected, which has made corrections quite widespread. Thus, accuracy at source-data capture is critical.

—Louisville & Nashville is using its network model to help operating managers make those "what if?" decisions pay off. Here is one that proved to be a winner: For northbound traffic, Atlanta to Louisville, what would be the effect of having the train bypass classification at Nashville, yet pick up a Louisville-bound block there from Birmingham off a Chicago-bound train? Prediction from the model was an average of 30 cars per day from Birmingham, 43 cars daily from Atlanta, and an improved transit time of 12 to 24 hours. Since the prediction looked favorable, operations did just that. Performance, based on actual measurements in a 10-day period following the schedule and operating changes showed an improved transit

(Continued on page 40)

Market Outlook

CARLOADINGS

Loadings of revenue freight in the week ended Sept. 23 totaled 544,500 cars, according to the Association of American Railroads. This was a decrease of 2,897 cars, or 0.5%, compared with the previous week, and an increase of 30,754 cars, or 6%, compared with the corresponding week last year. Ton-miles generated by carloadings in the week ended Sept. 23 are estimated at 16.2 billion, an increase of 8.9% above the corresponding week of 1971.

REVENUE FREIGHT CARLOADINGS

Commodity	Sept. 23 week	Sept. 16 week
Grain	28,747	29,134
Farm products	10,488	9,008
Metallic ores	41,814	43,817
Coal	95,527	94,697
Crushed stone, gravel & sand	30,287	31,083
Nonmetallic minerals	11,696	11,480
Grain mill products	20,313	20,376
Food and kindred products	25,715	24,834
Primary forest products	25,028	25,757
Lumber & wood products (except furniture)	18,173	18,193
Pulp, paper & allied products	24,391	23,160
Chemicals & allied products	26,926	26,522
Petroleum products	9,148	9,091
Stone, clay & glass products	22,328	22,853
Coke	6,819	7,530
Metals & products	24,719	24,806
Motor vehicles & equipment	26,901	25,888
Waste & scrap materials	15,488	15,563
Forwarder & shipper assn. traffic	7,031	6,854
All other carloads	72,405	72,459
LCL traffic	556	550
Total cars loaded	**544,500**	**543,655**
Cumulative total, 38 weeks	1972	1971
	18,811,277	18,962,998
Estimated revenue ton-miles (billions) 38 weeks	565.0	547.2

PIGGYBACK LOADINGS

U.S. piggyback loadings for the week ended Sept. 16 totaled 27,276 cars (11.6% above the corresponding week last year) and 47,028 trailers or containers (up 13.1% from 1971). Cumulative volume for the first 37 weeks of 1972 is 917,257 cars (up 9.1% from last year) and 1,540,669 trailers or containers (up 12.0% from 1971). In addition to freight, 1,923 cars carrying 3,402 trailers or containers of mail and express traffic were handled piggyback. Cumulative figures for the first 37 weeks of 1972 are 83,241 cars (down 25.7% from the 1971 total, and 135,168 trailers or containers (down 20.2% from 1971).

IN CANADA

7 days ending	Tons of Revenue Freight	Cumulative Totals
Sept. 7, 1972	3,390,164	137,200,030
Sept. 7, 1971	4,193,100	141,538,495

FREIGHT-TRAIN CARS

● *Canadian National.*—Ordered 140 70-ton, 18-ft-door box cars from National Steel Car at a cost of $2.7 million.

● *Illinois Central Gulf.*—Will build 340 freight cars in company shops at a cost of $4.3 million.

● *Soo Line.*—Doubled its current program for acquisition of covered hopper cars with an ACF order for 150 100-ton cars.

● *Trailer Train.*—Ordered 15 standard-level flat cars from P-S.

● *Freight-car orders and deliveries.*—The following report has been received from the ARCI and the AAR:

DELIVERED

	Aug. 1972	July 1972	Aug. 1971
Built new by carbuilders	2,822	2,297	2,778
Built new in R.R. shops	567	549	477
Built new—total	3,389	2,846	3,255
Rebuilt	312	125	287
TOTAL DELIVERED	**3,701**	**2,971**	**3,542**

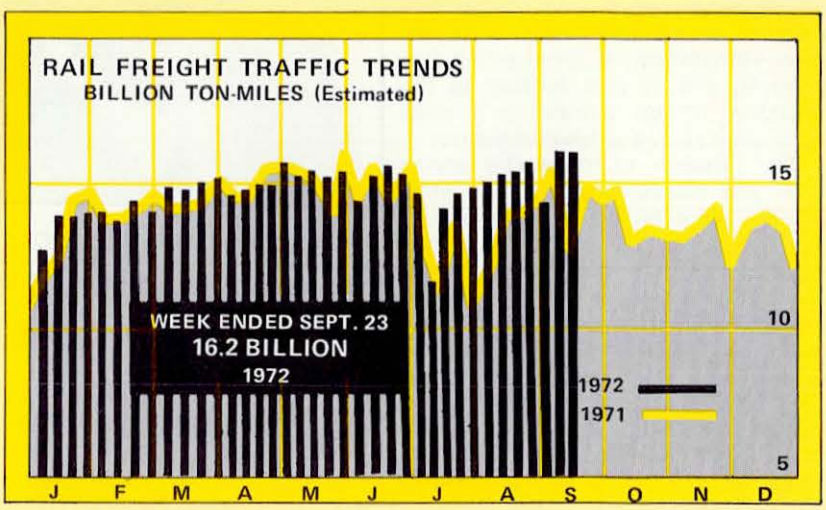
ORDERED

To be built new by carbuilders	4,975	2,711	1,211
To be built new in R.R. shops	137	221	0
To be built new—total	5,112	2,932	1,211
To be rebuilt	367	-68*	275
TOTAL ORDERED	**5,479**	**2,864**	**1,486**

ON ORDER AND UNDELIVERED

	Sept. 1, '72	Aug. 1, '72	Sept. 1, '71
To be built new by carbuilders	14,493	12,340	22,639
To be built new in R.R. shops	4,257	4,687	3,790
To be built new—total	18,750	17,027	26,429
To be rebuilt	1,961	1,906	2,331
TOTAL ON ORDER	**20,711**	**18,933**	**28,760**

*Cancellation of previously ordered cars.



Source: Association of American Railroads

Harris poll projects big future for Amtrak

Opinion-sampler Louis Harris—the man who calls national elections just about as close as anybody—has just taken a $200,000 sampling of opinions about the future of intercity train travel. The results were not uniformly encouraging—but they were encouraging enough to convince Harris that Amtrak can double its business in the next two years.

Harris found it "discouraging" that while 82% of the people surveyed last May think Americans should have the option of riding trains, only 4% of them actually made an intercity trip in the preceding 12 months. But the underlying attitudes uncovered in the poll, said Harris, suggested that the 4-out-of-100 who now use trains can be increased to 8-out-of-100 with the proper marketing techniques. The attitudes which Harris found so encouraging are summarized in the accompanying table, one of 37 statistical tables which came out of the Harris sampling of 3,000 households. (By comparison, only 1,600 households are sampled in national election surveys.) On top of the cross-section of 3,000, Louis Harris and Associates did an oversample of 1,000 people who had actually made intercity trips by rail in the previous year.

Amtrak President Roger Lewis, appearing with Harris at a news conference in New York Oct. 3, appeared to share the pollster's confidence in the future of the intercity rail passenger market. He said Amtrak was ready to commit $147 million for the purchase of new cars and locomotives in the next few months. And he said he was "very hopeful" that the pending proposal for a $460 million upgrading of rail facilities in the Northeast corridor—in terms both of new high-speed equipment and track improvements—would win approval soon.

(Harris suggested that Amtrak de-emphasize speed in its marketing efforts and concentrate more on the attractions of train travel—comfort, safety, scenery, and "the ability to get up and walk around." Lewis said, however, that speed was an important consideration in the busily-traveled corridors which he feels must have Amtrak's first priority. These corridors exist not only in the Northeast, he said, but around Chicago, St. Louis, in California and in Florida. At the same time, Lewis indicated faith in the future of Amtrak's long-distance trains: "Our five transcontinentals were fully booked all summer," he noted.)

● **"A clear mandate."** The basic finding of the poll, said Harris, "is that there is a clear and decisive public mandate for providing and continuing and improving intercity passenger train travel."

What motivates people to travel—and how trains might attract them

	Very Important %	Train Rating: Positive %	Train Rating: Negative %	Train is Best Way to go: Total Public %	18 to 29 %	College %	$15,000 and Over %
13 Top Motivators for Travel							
Positive for train travel							
Cost of trip	63	36	28	13	10	12	11
Personal comfort	46	45	31	19	11	16	13
Safety	41	67	11	36	29	33	31
Look out and see interesting things en route	31	63	18	38	31	43	43
Arrive rested and relaxed	13	50	26	18	14	15	13
Be able to get up and walk around	13	61	18	62	61	65	63
Arrive on time	9	42	31	16	12	17	13
Friendly, helpful employees	8	40	27	11	6	8	6
Negative for train travel							
Reach destination quickly	19	35	41	5	3	3	2
Flexible when can leave	15	25	42	8	6	6	6
Quality food available	18	32	39	15	9	13	11
Good food at reasonable prices	17	23	36	13	11	12	9
Modern washroom facilities	9	33	33	16	11	14	13
Average potential penetration on all items				21	18	20	18
Current penetration by rail service				4	6	7	6

TRAVEL ATTITUDES as reflected in this table suggest that railroads' present 4% share of intercity market can be doubled, says Louis Harris.

He summarized the major findings of the poll:

—The public by a margin of 64% to 22% favors continuing intercity passenger train service "even if it means Federal subsidies."

—A 53% majority of the public also feel the Federal government has a "responsibility to see that vital and important passenger services are improved."

—By a large majority, the public feels it must have the option of passenger rail travel (82%-10%).

—By a large majority, the public believes "trains are vital for the country" (90%-4%).

—By a large majority, the public holds the view that "long distance passenger travel is essential in a national emergency" (75%-15%).

—Nearly three out of every four people surveyed feel "train travel is a very important part of America's transportation system" (73%-19%).

—A majority of 57% feel that trains "pollute the air the least of any form of transportation."

—A majority of 54% think it is "a very important priority for the nation to improve the quality and availability of rail-passenger travel" more than bus travel, faster air travel, or new airports.

—A majority of 52% believe that rail travel uses "the least amount of fuel" in a time of critical energy requirements.

—A majority of 56% believe it is "very important to develop fast, comfortable, intercity passenger trains."

During the news conference, Lewis announced that Amtrak had a loss of $153.47 million in the fiscal year ended June 30. That meant, he said, that Amtrak paid out about $2 for every $1 taken in. He said Amtrak is projecting a loss of only $128 million in the fiscal 1973, despite a $20-million wage increase which must be absorbed.

Present projections, said Lewis, are that Amtrak within the next two years will reduce its operating ratio from the present 200% to 150%. A doubling of Amtrak's patronage would put the corporation "near the break-even point," he added.

● **Corridor ridership up.** Lewis also announced substantial increases in Northeast Corridor ridership. He said patronage on the New York to Boston route was up 38.5% in July and 39% in August; Metroliner ridership between New York and Washington increased 25.6% in July and 33.3% in August. All comparisons are with corresponding months a year ago. ■

Viewpoint

BN's Menk prescribes for the health of business

Recent surveys indicate strongly that it's not just the railroads that have an "image" problem. It's business generally. A report from the White House Conference on the Industrial World, for example, cited a survey in which 49% of those polled disagreed with the idea that business profits produce benefits for all and 65% accepted the premise that many of the largest companies ought to be broken up for the good of the country. Perhaps even worse, that same Conference reported that 20% of today's high school seniors seem to think that the free-enterprise system is so bad that it needs a complete overhaul. The comparable figure in a similar survey taken 20 years ago was only 5%.

It was this over-all problem that Burlington Northern Chairman Louis W. Menk was attacking in a recent appearance before the prestigious Town Hall of California. Menk talked about a lot of things. He talked about transportation—and BN is the nation's biggest railroad in terms of mileage. He talked about the need for land-holders to be "good stewards" of the land—and among railroads BN is a major land-holder with 2.3 million acres owned outright and mineral rights on six million acres. He talked about what BN is doing. But most of all he talked about what business ought to be doing—especially in that broad and sometimes fuzzy area which, for want of a better term, is called "communication."

AT BN, he said, "we are deeply concerned by the gravity of attacks on business in this country, concerned that a distorted view of the role of business will cause lasting injury to the concept and practice of free enterprise." But, he added, "we are troubled also by business' own somewhat ineffective response to these criticisms. Business is not making itself understood."

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PREACHING WON'T DO THE JOB

Menk's point is all too valid. Today's youth will indeed be tomorrow's managers—*and* union leaders, *and* legislators. And industry will not get communications working with youth through "charming little programs of annual visitations." Preaching won't do the job either, nor will advertising or ordinary "public relations." What might help do the job is involvement—involvement in such activities as 4-H, Junior Achievement, Explorer Scouting.

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Harris poll projects big future for Amtrak

Opinion-sampler Louis Harris—the man who calls national elections just about as close as anybody—has just taken a $200,000 sampling of opinions about the future of intercity train travel. The results were not uniformly encouraging—but they were encouraging enough to convince Harris that Amtrak can double its business in the next two years.

Harris found it "discouraging" that while 82% of the people surveyed last May think Americans should have the option of riding trains, only 4% of them actually made an intercity trip in the preceding 12 months. But the underlying attitudes uncovered in the poll, said Harris, suggested that the 4-out-of-100 who now use trains can be increased to 8-out-of-100 with the proper marketing techniques. The attitudes which Harris found so encouraging are summarized in the accompanying table, one of 37 statistical tables which came out of the Harris sampling of 3,000 households. (By comparison, only 1,600 households are sampled in national election surveys.) On top of the cross-section of 3,000, Louis Harris and Associates did an oversample of 1,000 people who had actually made intercity trips by rail in the previous year.

Amtrak President Roger Lewis, appearing with Harris at a news conference in New York Oct. 3, appeared to share the pollster's confidence in the future of the intercity rail passenger market. He said Amtrak was ready to commit $147 million for the purchase of new cars and locomotives in the next few months. And he said he was "very hopeful" that the pending proposal for a $460 million upgrading of rail facilities in the Northeast corridor—in terms both of new high-speed equipment and track improvements—would win approval soon.

(Harris suggested that Amtrak de-emphasize speed in its marketing efforts and concentrate more on the attractions of train travel—comfort, safety, scenery, and "the ability to get up and walk around." Lewis said, however, that speed was an important consideration in the busily-traveled corridors which he feels must have Amtrak's first priority. These corridors exist not only in the Northeast, he said, but around Chicago, St. Louis, in California and in Florida. At the same time, Lewis indicated faith in the future of Amtrak's long-distance trains: "Our five transcontinentals were fully booked all summer," he noted.)

● **"A clear mandate."** The basic finding of the poll, said Harris, "is that there is a clear and decisive public mandate for providing and continuing and improving intercity passenger train travel."

What motivates people to travel—and how trains might attract them

	Very Important %	Train Rating: Positive %	Train Rating: Negative %	Train is Best Way to go: Total Public %	18 to 29 %	College %	$15,000 and Over %
13 Top Motivators for Travel							
Positive for train travel							
Cost of trip	63	36	28	13	10	12	11
Personal comfort	46	45	31	19	11	16	13
Safety	41	67	11	36	29	33	31
Look out and see interesting things en route	31	63	18	38	31	43	43
Arrive rested and relaxed	13	50	26	18	14	15	13
Be able to get up and walk around	13	61	18	62	61	65	63
Arrive on time	9	42	31	16	12	17	13
Friendly, helpful employees	8	40	27	11	6	8	6
Negative for train travel							
Reach destination quickly	19	35	41	5	3	3	2
Flexible when can leave	15	25	42	8	6	6	6
Quality food available	18	32	39	15	9	13	11
Good food at reasonable prices	17	23	36	13	11	12	9
Modern washroom facilities	9	33	33	16	11	14	13
Average potential penetration on all items				21	18	20	18
Current penetration by rail service				4	6	7	6

TRAVEL ATTITUDES as reflected in this table suggest that railroads' present 4% share of intercity market can be doubled, says Louis Harris.

He summarized the major findings of the poll:

—The public by a margin of 64% to 22% favors continuing intercity passenger train service "even if it means Federal subsidies."

—A 53% majority of the public also feel the Federal government has a "responsibility to see that vital and important passenger services are improved."

—By a large majority, the public feels it must have the option of passenger rail travel (82%-10%).

—By a large majority, the public believes "trains are vital for the country" (90%-4%).

—By a large majority, the public holds the view that "long distance passenger travel is essential in a national emergency" (75%-15%).

—Nearly three out of every four people surveyed feel "train travel is a very important part of America's transportation system" (73%-19%).

—A majority of 57% feel that trains "pollute the air the least of any form of transportation."

—A majority of 54% think it is "a very important priority for the nation to improve the quality and availability of rail-passenger travel" more than bus travel, faster air travel, or new airports.

—A majority of 52% believe that rail travel uses "the least amount of fuel" in a time of critical energy requirements.

—A majority of 56% believe it is "very important to develop fast, comfortable, intercity passenger trains."

During the news conference, Lewis announced that Amtrak had a loss of $153.47 million in the fiscal year ended June 30. That meant, he said, that Amtrak paid out about $2 for every $1 taken in. He said Amtrak is projecting a loss of only $128 million in the fiscal 1973, despite a $20-million wage increase which must be absorbed.

Present projections, said Lewis, are that Amtrak within the next two years will reduce its operating ratio from the present 200% to 150%. A doubling of Amtrak's patronage would put the corporation "near the break-even point," he added.

● **Corridor ridership up.** Lewis also announced substantial increases in Northeast Corridor ridership. He said patronage on the New York to Boston route was up 38.5% in July and 39% in August; Metroliner ridership between New York and Washington increased 25.6% in July and 33.3% in August. All comparisons are with corresponding months a year ago. ■

Role of computer is emphasized

(Continued from page 37)

time (Atlanta to Louisville) of 17 hours. Cars handled averaged 30 per day from Birmingham and 41 per day from Atlanta, reported S.A. Alward, vice-president-management information services, Seaboard Coast Line/Louisville & Nashville. Sometimes the model is just as useful in saying "don't do it" Alward said. "Over-all system improvement is the goal, and the real worth of the model is in pointing out those cases where changes should not be made."

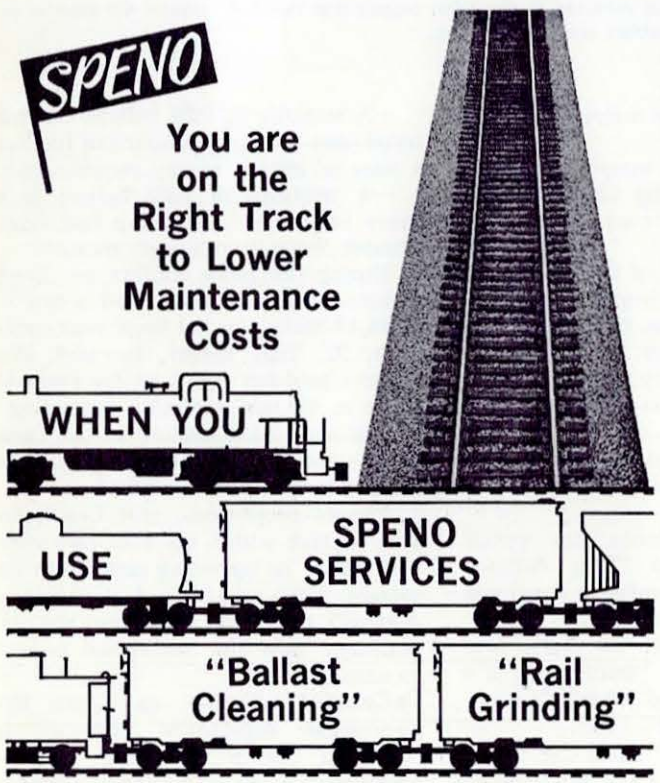
—Illinois Central Gulf has given a helpful boost to motive-power maintenance by its computerized MACS (Motive Power Accounting & Characteristics System). Briefly, data flows from shops into mechanical department headquarters where it is checked, coded and entered into the computer to become the MACS data base. The data is concerned with inspections and work done on locomotives, as well as labor and material used.

● **CPU's aid signaling.** Computers came in for their share of attention on the signal side of the meetings. A computer-oriented centralized traffic control system which combines the principles of pushbutton control with the high-speed and volume-processing capabilities of a digit minicomputer was the subject of a paper by D.B. Marsh, section manager, system development, General Railway Signal Co. In this system, known as Traffic Master II, the conventional track diagram is replaced by cathode ray tube displays. The control console keyboard enables the operator to call up an enlarged track plan of a selected siding on his control crt, which displays the current status. He uses the keyboard to initiate controls to the field via the computer, which also provides status displays on the crt's.

● **CN installs cpu-ctc.** A centralized traffic control system in which logic functions are carried out by a computer rather than by relays has been installed by Canadian National on 512 miles of line between Jasper and Vancouver, B.C. reported D.H. Green, manager-signal systems. Also, in this system, digital communications link the control location at Kamloops, midway in the territory, with the various field locations. Transmission rates are 600, 1,200 or 2,400 bits per second.

Known as System 600, this is a development of Union Switch & Signal Division of WABCO. Basic advantages cited include greater flexibility and data-handling capacity compared with relay systems. Changes in programming can be performed without disturbing wiring or components. Automatic dispatching can be handled via a software program. For consolidation of existing ctc installations, System 600 can be directly interfaced with existing office code units and will not require any revision to existing field station equipment.

● **Electrification coming.** Even the problems once considered either unsolvable or costly to solve appear to have shrunk in size as regards electrification. Experiences related by a panel revealed that signal and communications engineers may face the motive-power changeover sooner than earlier realized. Some experience in this area is currently being obtained where railroads are leasing right-of-way to power companies for high-voltage transmission lines. In most instances, signal and communications circuits are being provided in buried multi-conductor cables. Some roads have installed microwave to handle communications circuits. Aerial cable has been effectively used for handling signal circuits. ■



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Edgewater Corporation 28-29

General Electric Company 16-17
GTE Lenkurt Incorporated 22-23

Kerite Company, The . . . . . IBC

Mobil Oil Corporation 3

National Car Rental System, Inc. 9

Rails Company, The 40
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Viewpoint

BN's Menk prescribes for the health of business

Recent surveys indicate strongly that it's not just the railroads that have an "image" problem. It's business generally. A report from the White House Conference on the Industrial World, for example, cited a survey in which 49% of those polled disagreed with the idea that business profits produce benefits for all and 65% accepted the premise that many of the largest companies ought to be broken up for the good of the country. Perhaps even worse, that same Conference reported that 20% of today's high school seniors seem to think that the free-enterprise system is so bad that it needs a complete overhaul. The comparable figure in a similar survey taken 20 years ago was only 5%.

It was this over-all problem that Burlington Northern Chairman Louis W. Menk was attacking in a recent appearance before the prestigious Town Hall of California. Menk talked about a lot of things. He talked about transportation—and BN is the nation's biggest railroad in terms of mileage. He talked about the need for land-holders to be "good stewards" of the land—and among railroads BN is a major land-holder with 2.3 million acres owned outright and mineral rights on six million acres. He talked about what BN is doing. But most of all he talked about what business ought to be doing—especially in that broad and sometimes fuzzy area which, for want of a better term, is called "communication."

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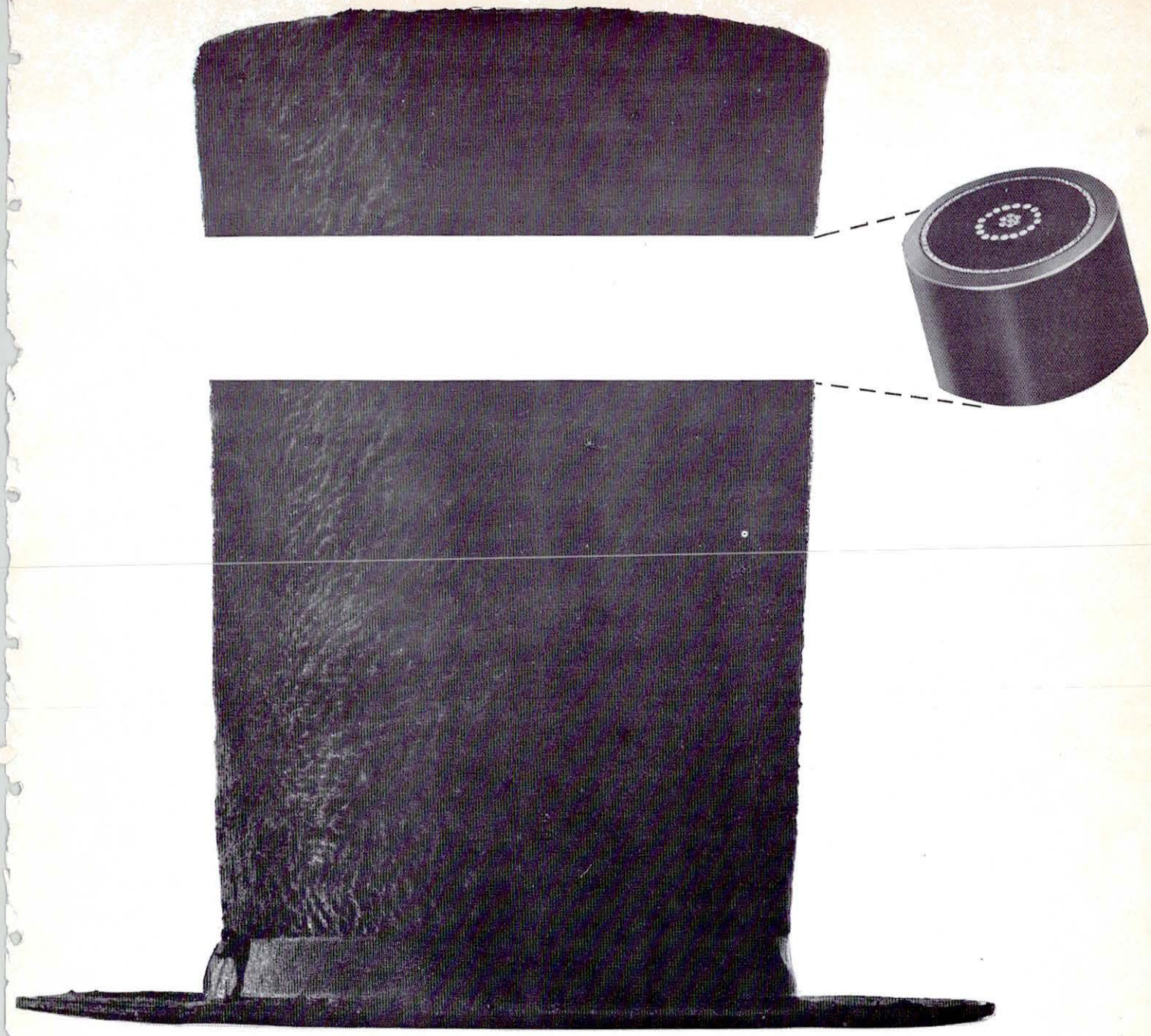

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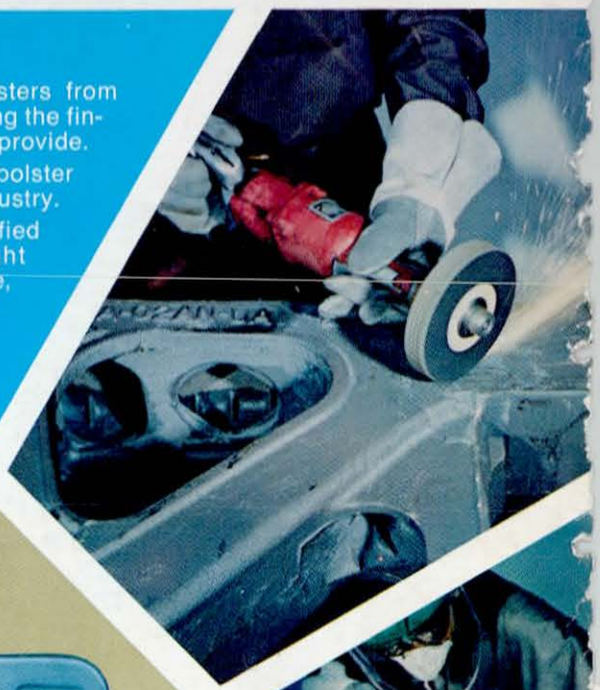

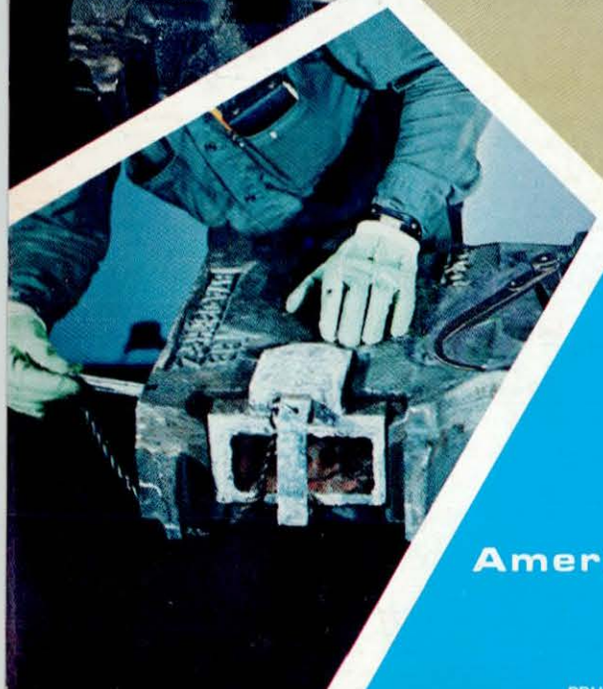

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